THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXX. No. 740.] LONDON, JULY 17, 1877. [29TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—12,000 cubic feet of gas per ton of coal; 28-candle gas; coke, 66·70 per cent.; volatile matters, 33·30 per cent. Coke of good quality.

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These Paints are now used in 150 Country Gas-Works, and by all the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.

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J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

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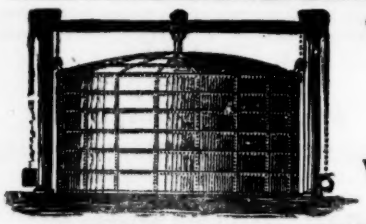

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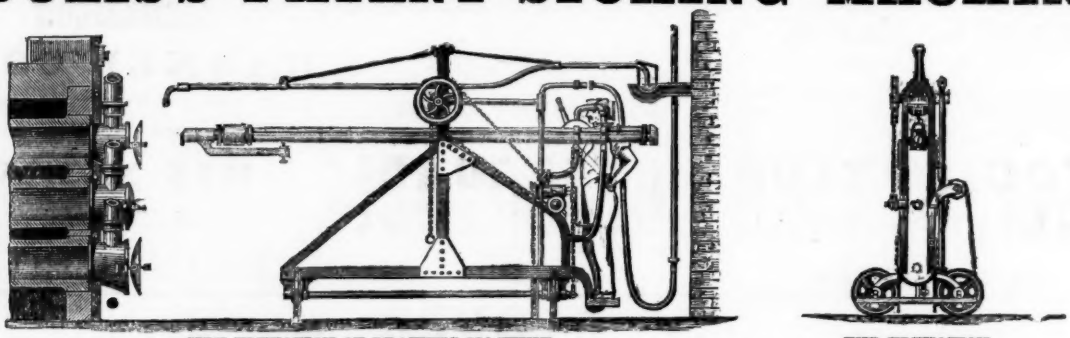

SIDE ELEVATION OF DRAWING MACHINE. END ELEVATION.

(The Charging Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz:
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SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 1000 days, and are yet in good order. Referenees on application.

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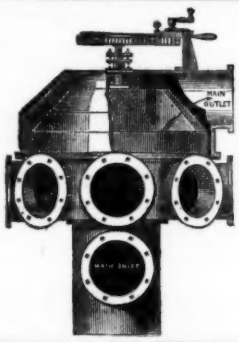
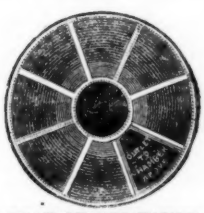
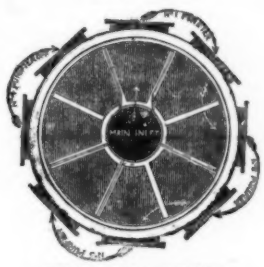


ELEVATION OF THE CENTRE-VALVE.

C. & W. WALKERS'
PATENT CENTRE-VALVES.



PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

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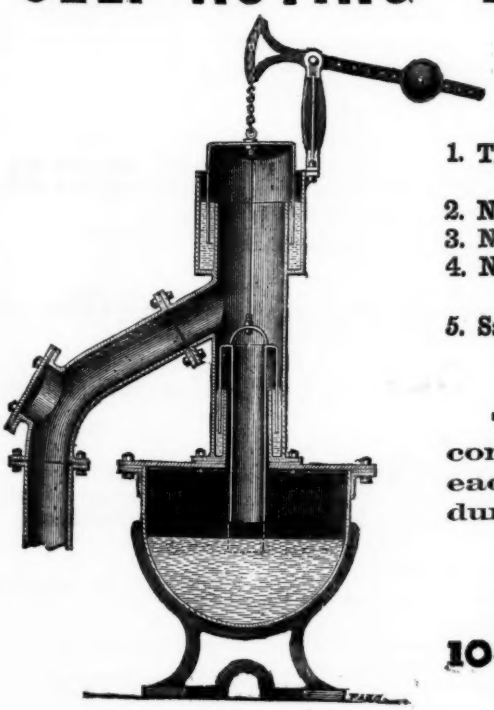
SELF-ACTING REMOVABLE DIP-PIPE,



PATENTED BY

CHANDLER & STEVENSON.

ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

These Dip-Pipes can now be supplied complete, except the flanched bend, for £4 each, which includes the charge for licence during the whole term of the patent.

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Who fix the Dip-Pipes, at a small Charge, when required.

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"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

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Attention is called to their Dry Meters in Wood Cases, as used by the principal London Gas Companies. These Meters are especially suitable for seaport towns and for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

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OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

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And all kinds of Experimental Gas Apparatus.

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NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

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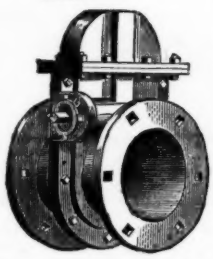
LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

B. DONKIN & CO.'S

IMPROVED GAS-VALVES

WITH WROUGHT-IRON PINIONS.



List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.

These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.

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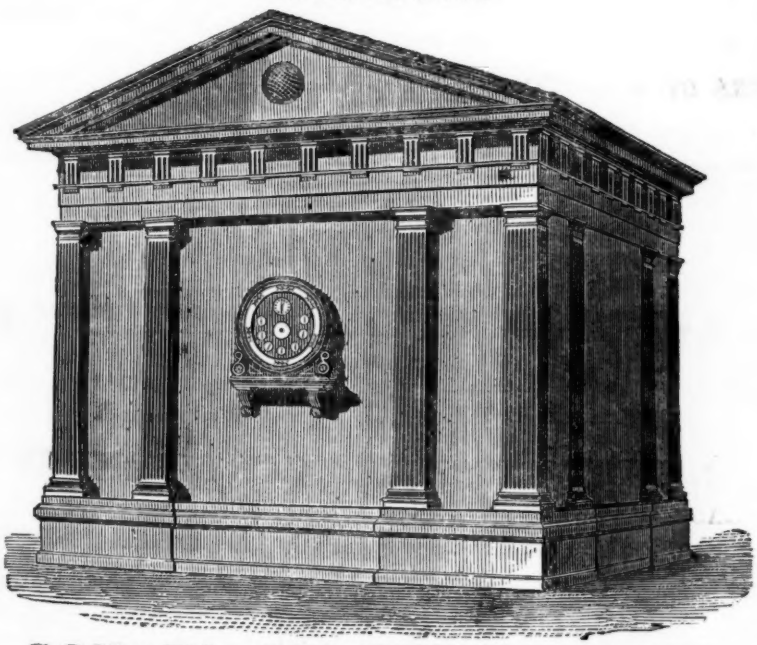

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Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.
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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.
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Successors to
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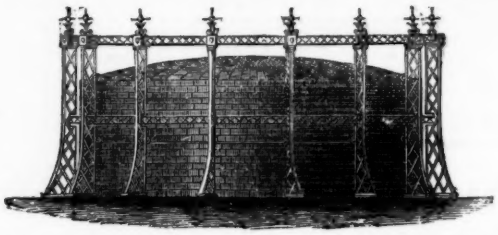

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TIPTON, STAFFORDSHIRE.
LONDON OFFICE:
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GAS OR WATER WORKS;
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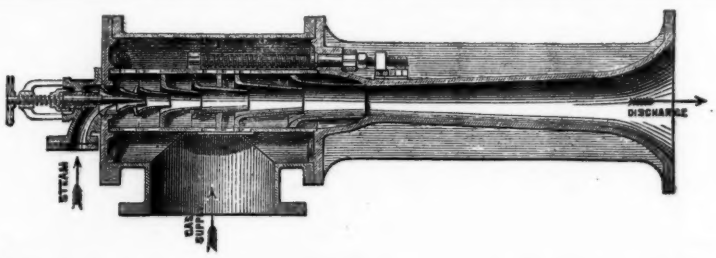

KÖRTING'S STEAM-JET GAS-EXHAUSTER.
IMPROVED CLELAND'S PATENT.
UPWARDS OF 250 IN USE.
CLELAND'S PATENT CONDENSER AND STEAM SCRUBBER.
FOR PARTICULARS, APPLY TO
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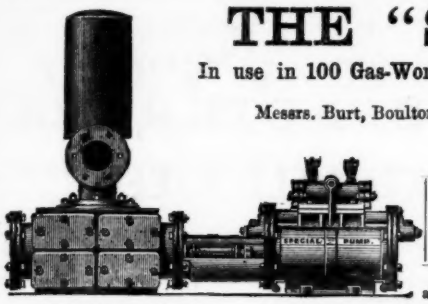


In use in 100 Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

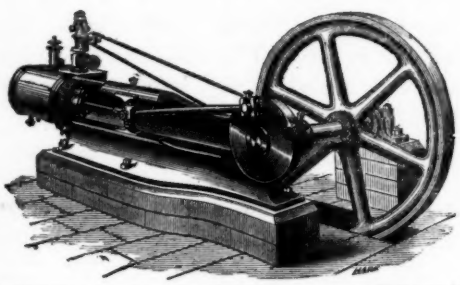
Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have Forty "Special" Steam-Pumps in use at their several large Tar-Works.

200 Sizes made. The following are the Leading Sizes for Gas-Works:—

Steam Cylinder . . .in.	3	4	3	5*	5*	4	6*	5	7*	6	8*	7	10*
Water Cylinder . . .in.	1½	2	3	2½	3	4	4	5	5	6	6	7	7
Gallons per hour . . .	450	815	1830	1250	1830	3250	3250	5070	5070	7330	7330	9750	9750
Price	£16	£18	£18	£21	£22½	£25	£30	£32½	£40	£40	£50	£50	£65

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HORIZONTAL HIGH-PRESSURE STEAM-ENGINES.



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LOW PRICE
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HAVE CALLED FORTH
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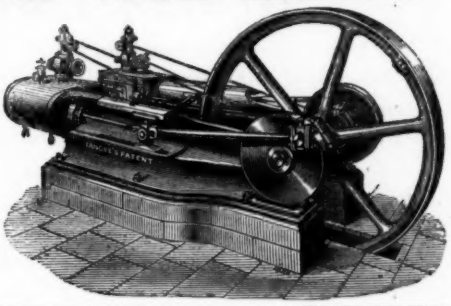
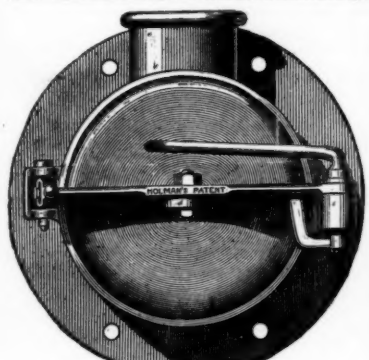
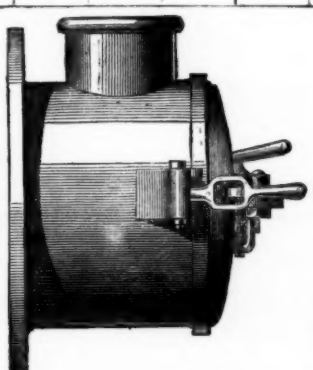
Over 2000 Sold

Since December, 1869.



SIZE	B	C	D	E	G	H	I	J	K	M
Nominal Horse Power	TWO	THREE	FOUR	SIX	EIGHT	TEN	TWELVE	FOURTEEN	EIGHTEEN	TWENTY-FIVE
Price of Engine, with Governor	£28 0	£38 0	£46 0	£70 0	£90 0	£115 0	£127 0	£140 0	£195 0	£220 0
Feed-Pump, extra	3 0	3 15	4 0	5 10	6 0	7 10	7 10	8 0	10 0	15 0
Variable Expansion Gear, extra	..	..	..	..	13 0	14 0	15 0	15 0	20 0	25 0





MORTON'S
Patent Self-Sealing
RETORT LIDS,

WITH

HOLMAN'S NEW PATENT BRACKETED CROSS-BARS, ANTI-FRICTION CATCHES, AND ECCENTRIC FASTENINGS.

Instantaneous Sealing effected. No Luting. No Duplicate Lids required. Holman's New Self-Sustaining Cross-Bar ensures freedom of joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested (rigid cast iron is now successfully employed), nearly 25,000 being in use at various Gas-Works in London and the Provinces.

IMPORTANT TESTIMONIAL.

The Gaslight and Coke Company (commonly called the Chartered Gas Company), Beckton, North Woolwich.

Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them. I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

I am, yours truly, (Signed) G. C. Trewby.

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dronfield, Dursley, Exeter, Guernsey, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875

Messrs. Tangye Brothers and Holman.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,

(Signed) John Johnson.

PRICES AND FULL PARTICULARS ON APPLICATION TO

TANGYE BROTHERS & HOLMAN,

SOLE MANUFACTURERS,

LAURENCE POUNTNEY LANE, LONDON, E.C.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

TO GAS ENGINEERS AND MANAGERS.

It having come to our knowledge that a report is in circulation, spread by some unprincipled person or persons, that the cases of our larger-sized Meters are made of Galvanized Iron, we think it only fair to ourselves, and just to our customers, to say, that we never have used, in making any of our Meters, a single pound of *Galvanized Iron*, or any other *cheap* and *inferior material*, and this can be easily seen by opening any of them.

The cases of our large-sized Meters, from 20 lights and upwards, are all made of the very *Best Best Patent Alloy*, which is nearly double the price, and will last more than double the time, of some other material that has been and still is very largely used for the same purpose. And our experience, acquired by an extensive use of it for upwards of 30 years, enables us to say with confidence that no other metal in use for the purpose is so little liable to corrosion from the action of the gas.

We have now in use a Meter made in 1848, and therefore 29 years old, the case of which is made of Patent Alloy; the Meter is still in perfect order, and shows no signs of decay.

The utmost care is exercised by us in selecting none but the very best materials for all parts of our Meters; much of it is made *expressly for us*, as it is not possible to obtain it in the open market of the same superior quality.

The great fall in the price of all materials used in making our Meters has enabled us to give an increased discount, thus giving our customers the benefit of the fall. This we were bound in fairness to do, as we raised the price of our Meters four years ago, when the price of all metals went up.

It will be our constant endeavour, by using none but the best materials, and employing the most skilful workmen, to maintain the high character our Meter has hitherto borne.

WILLIAM PARKINSON & CO.

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF PATENT

WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

F. G. *asks:* "*Which of the two following systems do you consider the best for the effective purification of coal gas, so far as scrubbers are competent for this purpose?*—System No. 1. *To pass the gas through a scrubber, supplied with the ammoniacal liquor from the hydraulic main, condenser, &c.; thence through another scrubber supplied with clean water proportionate to the make of gas.*—System No. 2. *To pass the whole of the gas through one scrubber, having a cubical capacity equal to both those in System No.* 1, *and supplied with clean water only.*" [*No.* 1 *will certainly be more effective.*—ED. J. G. L.]

J. H. *asks:* "*How can we prevent the disagreeable smell arising from gas stoves? It is now preserving-time for fruits, &c.; but several good customers are abandoning the use of these stoves, in consequence of the effluvium, although they have cost from, say,* £2 *to* £9 *or* £10. *The flue does not always take it, the draught being often inwards instead of outwards. They say it causes headache, nausea, &c. Can it be remedied?*" [*The simple explanation of the alleged nuisance is the inadequate supply of air to the gas-burners. When an ample supply of air is furnished, no disagreeable smell can possibly be occasioned. Our correspondent should recommend his customers to increase the area of the chimneys, and enlarge the channels for the supply of air to the burners. If that be done the annoyance will cease.*—ED. J. G. L.]

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THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 17, 1877.

Circular to Gas Companies.

As was naturally expected, a reaction has taken place in the share market, and gas property is again quoted at what we shall not call its normal value, but at prices approaching to those which have for some time obtained. Communications that have reached us show that shareholders have been seriously alarmed, and the opportunity was seized upon by speculators to "bear" gas shares. The panic, if it may so be called, was, however, of short duration, and full confidence in the value of gas property seems to be re-established. In considering the causes of the panic, the electric candle must not be overlooked, for, undoubtedly, that was the prime cause of the downward movement of prices. But those who took alarm at the prospect of a competition of gas with a new source of light, cannot have given a full consideration to the circumstances of the case. It would be a ridiculous affectation to pretend to shut our eyes to proved facts. The "electric candle"—crude as the invention may be said to be in its present state—is a fact. But one of the first advantages claimed for it shows how little likely it is to supersede gas. You get light without heat, we are told. Well, one great recommendation of gas is, that its combustion gives heat as well as light. Its employment in shops and warehouses saves the consumption of a large amount of fuel for the purpose of warming the establishments. Used in an ordinary sitting-room, the temperature soon rises to a degree which renders a fire unnecessary on the coldest winter evening. A single burner in a bed-room is a source of infinite comfort. If the electric light were employed in a large theatre, the manager would, in winter, be compelled to resort to some means of artificially warming the auditorium, or the fashion of opera cloaks and evening-dress must greatly change.

And this leads us to remark once more, that enough has not yet been done to encourage the use of gas for heating purposes. There is no possibility, to-day at all events, of cooking by electricity; but if the advantages of gas were properly understood, not a fire would be lighted in the summer months where gas is accessible. The economy, comfort, and cleanliness of the use of gas for cooking purposes are acknowledged by all who have used it; but the first outlay of, it may be, only a few shillings, stands in the way of a more general adoption of gas for cooking. Why should not Gas Companies let out cooking-stoves as they do meters?

In connexion with the cost of the electric candle, it must be borne in mind that electricity leaves no residuals. The force and the fuel are completely expended, and with the present arrangement of the "candle," three-fourths, at least, is wasted, and we may take it that it will be long before this waste is prevented. The light is too intense for the human eye to bear, and if the current of electricity should ever be minutely subdivided, we expect that the brilliantly luminous point produced will require the same means of toning down and diffusing the light as is at present necessary in the case of the "candle."

Now, in well-regulated gas-works there should be next to no waste. Every ton of coal carbonized should be represented in gas, coke, tar, liquor, &c., and Gas Companies aiding to teach the public, we may anticipate that every cubic foot of gas consumed will be utilized to develop the greatest amount of light to be derived from its combustion.

Residuals are, in the present day, of no less importance than gas, and their manufacture as primary products would lead to important consequences. To begin with, ammonia may be said to be an agricultural necessity, and there is, at the present moment, no more prolific source of ammonia than coal. But it would never pay to distil coal for ammonia alone. Tar, or rather its derivatives, may also be said to be a necessity of modern civilization. Our aniline colours, our chief disinfecting agent, and the "creosoting" material (by means of which we preserve wood from decay) not to speak of anthracene, and other bodies, which receive important applications, are all derived from gas tar, and if coal were not distilled for gas it must be for tar. It is clear then that, whatever shape the electric light may eventually assume, coal will continue to be distilled, and that the most important product will be gas. And since the heating power of this product is of no less importance than its illuminating qualities, we are justified in concluding that, until a new source of heat as well as of light is discovered, the gas industry will continue to flourish.

Gas Companies, and, we may add, gas-supplying Local Authorities, to whom, indeed, the result is of the greater importance, may be said to have the matter in their own hands. They may encourage competition, or they may extinguish it. And here we would call attention to the able and candid paper read to the Gas Managers Association by Mr. W. H. Bennett. The author has "the courage of his opinions," and as he is intimately associated with Gas Companies, he ventures to tell them some wholesome truths. A Gas Company should be the "guide, philosopher, "and friend" of every gas consumer; but, unhappily, the only official of the Company whose acquaintance the ordinary consumer makes is that of the collector—his least welcome visitor. Now, this is not as it should be. There are, we rather think, only two cases in which Gas Companies are able to exercise any decided control over fittings; but all Companies have an advising power, which may be exercised to the greatest advantage, as much for their own benefit as that of the consumer. Let them exercise it. We never like to say anything unpleasant, but we are bound to say that there is no more ignorant or obtuse man in creation than the ordinary gas-fitter.

When speaking above of gas residuals, we neglected to mention coke, which, as cheap fuel, ought to command much attention.

That it is not better appreciated is owing to a variety of circumstances; but, in this utilitarian age, people are soon convinced if results show economy. Manufacturers well understand the value of coke. They get it, at times, rather too cheaply; but its domestic employment can only be said to be in a state of development. It is, we believe, seldom used as fuel by the middle classes, among whom its employment should be general. Taken altogether, we may strongly commend the attention of Gas Companies to Mr. Bennett's observations, whose interests we are certain he is sincerely desirous to promote.

Mr. Warner has made several valuable communications to the Association, but never one that better deserved the attention of Gas Companies than that contributed at the recent meeting, "On "Periodical District Pressure Taking." Profits are said to be made in the retort-house; and it may be added that they are sometimes dissipated in the distributing apparatus. Now that every Special Gas Act and Provisional Order prescribes day and night pressures, which may be taken on a main at any spot within the district supplied by a Company, it becomes an imperative duty to—as Mr. Warner aptly puts it—feel the pulse of the works occasionally. Mr. Warner's plans and apparatus will, we think, commend themselves to all Companies for their economy and efficiency.

In Mr. Lass's paper on the "Form of Accounts Prescribed "by the Gas-Works Clauses Act Amendment Act, 1871," we find an agreement with the opinion we have repeatedly expressed, as to the desirability of Companies, and also Corporations, keeping and publishing their accounts on one uniform system. The advantages to be derived from this are so apparent, and are so well described by Mr. Lass, that they need not be here mentioned. The gas accounts of most Corporations are almost unintelligible, and are utterly worthless for the purpose of comparing working details, which affords the means of checking the management. It is to the credit of the Corporation of Nottingham that they have been the first authority to adopt a form of accounts which closely resembles that prescribed by the Act of 1871, and we hope others will speedily follow.

And here we have to take leave of the Association for another year. Their next meeting will possess peculiar interest; the ordinary session will take place in London, but after its termination such members as can spare the time will proceed to Paris, where they will have the opportunity of "assisting" at the meeting of the *Société Technique de l'Industrie du Gaz*, and inspecting the works of the Paris Gas Company. We counsel liberality on the part of Directors and Corporations, to afford their Managers time and means to attend this *réunion*, for there is much to be learned in Paris.

The meeting of the *Société* for the present year took place recently at Rouen, but we have as yet only the opening address of the President, M. Le Bon, which deals with little more than the internal affairs of the Society. The papers subsequently read treat of some important topics, and, as they are published, we shall present them to our readers.

The German Association of Gas Managers have also recently met at Leipsic, and have discussed matters of much interest. Amongst others, the system of setting and heating retorts, described by Mr. Voss in our last, was brought under consideration. The Körting-Cleland Exhauster formed the subject of another paper; and Mr. Foulis's Hydraulic Stoker was also brought under review. The working up of ammoniacal liquor, and apparatuses for cooking and heating by gas, also formed the subjects of papers, which we hope to be able to publish in the course of time.

It will be seen in another column that our friend Mr. Bower is in favour of transferring the gas undertaking of St. Neots to the Local Authority. We should not notice the transaction, for it is a small affair, but for the fact that Mr. Bower takes the opportunity of defending the right of Local Authorities to make a profit at the expense of the gas consumers. We agree with him that the general body of ratepayers are responsible for the purchase-money of the works; but our contention has always been that the undertaking should be made self-supporting, and, in that event, the ratepayers can suffer no loss. There is, it is true, a possible contingency that gas may become so dear that its consumption may be discontinued, and, in that event, the general body of ratepayers must necessarily suffer. This contingency, however, is so remote, that it need hardly be speculated upon. We may recommend Mr. Bower to peruse the latter part of the paper by Mr. Lass to be found in another column, and when he has succeeded in getting the gas undertaking transferred, to adopt the Scottish system of management.

We are somewhat astonished to see that the local press, in some of our northern boroughs and cities, where the Corporations have spent millions on the purchase of gas undertakings, hail with delight the advent of the "electric candle." If gas be superseded, the cost of the gas undertaking must remain a permanent charge on the rates, and we shall feel deeply indebted to M. Jablochkoff if his invention frighten authorities from making further purchases. In the facts and figures which Dr. Cross will shortly lay before the Town Council of Liverpool, we hope he will duly estimate the probabilities that gas may be soon extinguished. It will make no difference in the price which must be paid for the gas undertaking, but it may enlighten the ratepayers of Liverpool on a point of extreme importance. We shall not be misunderstood when we say that the question is whether the Corporation of Liverpool shall or shall not incur a perennial debt for an evanescent advantage.

Patriotic Americans have always deplored the enormous waste of force at the Falls of Niagara. They have told us, in times past, that it could do the corn-grinding and wood-sawing for all the continent; and to-day we have Dr. C. W. Siemens calculating that it might be employed to illuminate, say, half the continent, by means of the electric light. Dr. Siemens estimates the force wasted as equal to that which would be produced by the annual consumption of 266 million tons of coal, and he proposes that the fall of water should be utilized in driving a magneto-electric machine, which would produce light equal to about 250,000-candle power. Truth to say, we have not a particularly clear account of Dr. Siemens's ideas, but we feel bound to give our American gas brethren the earliest information as to the competition to which they may be subjected.

It is only fair to mention that in our notice of Mr. Hartley's pamphlet, and in our reference to the paper we published on the Valuation of Gas Liquor, no mention was made of the communication of Mr. Child to the Gas Managers Association last year, and published in the JOURNAL OF GAS LIGHTING, in vol. xxviii., p. 170. So far as we know, this is the earliest distinct description of the new process, as applied to the valuation of liquor.

There is a talk, both at Teddington and Maidenhead, about lighting the public lamps with petroleum oil, in consequence of disagreements between the Local Authorities and the Gas Companies. In the latter case there can hardly be a difficulty in arranging the dispute between the Local Authority and the Gas Company. As regards the former, we are not sufficiently well informed to be able to judge of the merits of the case; but, speaking generally, in the interests of Gas Companies, we may say that all Local Boards are welcome to adopt the use of oil for public lights if they choose to do so.

A judgment of much importance to Gas Companies was given by the Lords Justices of Appeal last week, and will be found reported in another column. It will be seen that the Coventry Gas Company claimed, as "landlords," a right of distress over the goods of a bankrupt as a tenant. Their contention was upheld in the Court of Bankruptcy; but, on appeal, the Lords Justices have decided that a Gas Company stand in exactly the same position as any other ordinary creditor, and have no priority of claim. The moral of the case must not be lost sight of: Gas Companies must collect their rent punctually, and if it be not paid, cut off the gas at once.

At a meeting of the Limerick Town Council on the 11th inst., the Mayor announced that an agreement had been made with the United General Gas Company for the sale of their undertaking to the Corporation for the sum of £26,000, and he assured the Council, at the same time, that the works had been valued by the most eminent English experts at £38,000. We fail to understand why the Company can have consented to make this sacrifice—that is, if they have really agreed to sell at the price stated.

The Meeting of the North British Association of Gas Managers was held last Friday, at Stirling. The proceedings were of a most useful and interesting kind, and will be found detailed at length in future numbers of the JOURNAL.

A very life-like portrait of Dr. William Pole, F.R.S., one of the Metropolitan Gas Referees, and well known for his researches on the Flow of Gas in Pipes in connexion with the late Mr. Barlow, has been published by Messrs. Black, of 184, Regent Street. It forms an interesting addition to the Gallery of Scientific Notabilities already issued by this firm, and probably many of our readers will be glad to possess a likeness of this eminent engineer.

Water and Sanitary Notes.

THESE are the days of Congresses, which take place on all conceivable subjects. The most recent projected is to meet at Birmingham next week, to discuss in, we do not now remember how many sections, the subject of what is called "Domestic "Economy." We, as sincerely desirous of giving aid to progress in whatever relates to the improvement of the sanitary condition of

the population, call attention to the proposed meeting, which we have no doubt will be very successful, for the Local Committee would, by themselves, constitute a very numerous and respectable audience. Among the readers of papers is our veteran friend, Mr. Edwin Chadwick, C.B., who is to discourse on "Head to Foot Washing." If any of our readers should hesitate about going to Birmingham, we may mention that the papers are to be printed and taken as read, and that the authors (except by special permission) are allowed only five minutes in which to explain the purport of their communications. Returning, however, to the subject of "Head to Foot Washing," we may remark that most centenarians are men and women in the poorer walks of life, the latter, probably, having seldom been washed from head to foot since they were infants. For the rest, a good deal will be said about "Food and Cookery;" "The Teaching of "Physiology to Children;" "Nursing;" and a good deal more, which our readers must go to Birmingham to hear; for, probably, nothing will be known of the proceedings beyond that borough. The fact is, these Congresses are becoming nuisances. They give lions and lionesses the opportunity of roaring and wagging their tails; but we fear that very little earnest work is revealed in the papers which are brought before these assemblages.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

SULPHUR PURIFICATION.

Sir,—As a chemist who is occasionally called upon to advise gas and other companies, and private manufacturers, on matters which admit of a difference of opinion, I must protest against being accused of "prostituting science" when I venture to differ in opinion from those opposed to me.

I have always held the notion that scientific men may differ in their views without being open to the charge of being dishonest. There are two opinions on the "sulphur question." I, for my own part, hold a very strong one, founded upon observations and experiments extending over many years; still I am quite willing to admit that there is something to be said on the other side. That "sulphur" is a cause of mischief I no more doubt than I doubt the action of solar light on the photographer's iodized plate.

The advent of the "electric candle" is hailed with delight all over England, mainly because it promises to obviate the discomforts and damage which arise from the combustion of ordinary coal gas. It is not because the proprietors of the *Magasin du Louvre* want a startling advertisement for their establishment that they encourage the "electric candle." Science has been so far prostituted that they have been convinced that they suffer enormously from damage done to their goods by sulphur. In the same way the director of the Grand Opera in Paris has been also bamboozled into the belief that sulphur in gas does damage to his decorations, which it costs him some thousands a year to repair. Coming nearer home, I am told of a single drapery establishment in the City of London, who, to-day, estimate the damage done to their goods by gas at £600 per annum; and, several years ago, the manager of a large silversmith's on Cornhill told me he believed that gas cost his firm, beyond the charges made by the company for it, about the same amount.

The question arises, Is not this loss and damage easily preventible? I will not say that Mr. Versmann "prostituted science" when, in 1860, he wrote a report showing that the gas of the Commercial Company contained from 3 to 6 grains of sulphur per 100 cubic feet. The method by which he determined the amount of this impurity was original and ingenious, and I accept his statement as the expression of an absolute and positive truth. The gas of the Commercial Company *did*, I have no doubt, contain from 3 to 6 grains of sulphur. I do not know the mode of purification then in use at the Commercial Gas-Works, but I may ask why, if gas could be brought to that degree of purity in 1860, it cannot be purified to the same extent in 1877.

Gas, at the present moment, may almost be said to be on its trial. There is no disguising the fact that it has a competitor. The "electric candle" is just now in the same state of development that gas lighting was when the Soho factory was first lighted by its means. There can be no question that great advances will be made, and that a generation or two will see enormous progress in this method of illumination.

I consider it singularly unfortunate that this moment should have been chosen by the Crystal Palace District and the Chartered Companies to bring forward the Bills they respectively promoted in the present session. The public are already sufficiently dissatisfied with gas, or, perhaps, I might rather say, with gas companies, and everybody is desirous to see gas superseded. In my opinion, the true interest of gas companies lies in purifying their gas to the utmost extent possible from an ingredient which, reasonably or not, the general public believe to be injurious. By following this suggestion they will promote the sale of gas, and, at the same time, remove from the minds of the consumers, notions which certainly are prejudicial to the interests of the companies.

W. T. Fewtrell.

13A, *Great George Street, Westminster, July* 12, 1877.

Sir,—The paragraph in Mr. Frederick Versmann's letter of last week referring to my evidence given before the Parliamentary Committee on the Crystal Palace Gas Company's Bill leads your readers to infer that I concealed from the committee the fact that the quantity of sulphur in Newcastle gas was sometimes above the parliamentary limit of 17 grains per 100 cubic feet. If Mr. Versmann refers to the report of my evidence, as given in your Journal of the 5th of June, he will see that I not only stated that the amount of sulphur sometimes rose considerably, and attempted to account for this fact, but that I actually stated that the highest amount I had found was 30 grains per 100 cubic feet; and if Mr. Versmann is the gentleman I have hitherto believed him to be, he will then see the propriety of at once withdrawing the offensive imputation conveyed in his letter.

John Pattinson,
Gas Examiner for the Newcastle-upon-Tyne Town Council.

75, *The Side, Newcastle-upon-Tyne, July* 12, 1877.

[We have received letters from Mr. G. Anderson and Mr. C. Heisch on the same subject; but as they only reached us late on Monday, their insertion is necessarily postponed.—Ed. J. G. L.]

GAS-EXHAUSTERS.

Sir,—After reading Messrs. Gwynne and Co.'s letter, in your issue of the 3rd inst., the impression left on our mind was that it showed clearly enough the writer's object, without requiring any comment from us, especially after the impartial remarks from "Steam-Jet," in your Journal of the 10th inst.

For ourselves, we do not wish to stimulate the sale of our jet exhausters by depreciating exhausters of other systems, and we are glad that the success we have obtained renders such a course unnecessary.

We think that, if the advantages which we claim for the jet exhauster were not to the fullest extent recognized by those gas engineers who are in a position to judge, from their own experience, of them, there would scarcely be any necessity for Messrs. Gwynne and Co. to publish the letter referred to. We are glad that our jet exhausters have, in a comparatively short time, found so many friends, not only in this country, but throughout the whole of Europe.

Donat Ruben (*pro* Körting Brothers).

7, *Lancaster Avenue, Fennell Street, Manchester, July* 14, 1877.

Mr. Robert Wilson, whose little book, "Common Sense for Gas Users," was reviewed in the Journal a few weeks ago, writes us a long letter, in the course of which he says: "In speaking of my remarks on the sulphur question, you say that 'the often-refuted statement of the formation of sulphuric acid in the combustion of coal gas is produced with a good deal of dogmatic assertion, which, considering that Mr. Wilson is an engineer, and not a chemist, is scarcely becoming.' Had you shown that my opinion is opposed to that of the great majority of chemists, I should not have complained; but, in the absence of any such showing, your remark was uncalled for." Again, he says: "You charge me with asserting that sulphuric acid *is* formed when coal gas is burnt, in contradiction to Dr. Odling's assertion in 1868 that it is *not* formed. Now, in the same number of your excellent Journal in which the review appears, there is quoted a statement by Dr. Odling, made 18 months after I penned mine, in which he says, 'I should say, as regards the results of my observations, that of the very small proportion of sulphurous products that are produced, about one-tenth part of that small proportion is converted into a state of sulphuric acid.' After this, and the evidence of all the other twelve professional chemists who were recently examined on the Crystal Palace District Gas Bill and The Gaslight and Coke Company's Bill, and who, with one doubtful exception, admitted that sulphuric acid *is* formed by the burning of ordinary coal gas, your remark might have been spared."

Parliamentary Intelligence.

HOUSE OF LORDS.

Monday, July 9, 1877.

The Christchurch Gas and West Surrey Water Bills were reported without amendment.

The Tudhoe and Sunderland Bridge Gas and the Ramsgate Local Board Bills were reported with amendments.

The Local Government Board's Provisional Orders Confirmation (Bishop Auckland, &c.) Bill—Bishop Auckland Gas Order—was referred to a Select Committee, consisting of Earl Cowper, chairman, Viscount Powerscourt, Lord Hatherton, Lord Seaton, and Lord Raglan; to meet on Wednesday, July 11.

The Reservoirs Bill was read the third time, with the amendments, and passed.

Thursday, July 12.

The Bristol United Gas and the Newcastle and Gateshead Water Bills received the Royal Assent by commission.

Friday, July 13.

The Heywood Water Bill was reported from the Select Committee, with amendments.

HOUSE OF COMMONS.

Monday, July 9.

The Gas and Water Orders Confirmation (Abingdon, &c.) Bill (Lords) was read a second time and committed

Tuesday, July 10.

The East Worcestershire Water Bill (Lords) was read the third time and passed, with amendments.

The Public Health (Ireland) Bill was read a second time, and referred to a Select Committee.

Wednesday, July 11.

The Blackburn Borough Gas, Water, and Extension, and the Londonderry Gas Bills (Lords), were reported with amendments.

Thursday, July 12.

Colonel North gave notice that on Monday, July 16, he would ask the President of the Local Government Board if his attention has been called to the report of Dr. Frankland upon the water supplied by the Southwark and Vauxhall Company, that it is "full of moving organisms, and contains an excessive proportion of organic impurity;" and, if he will take steps to ensure a supply of pure water from that company.

Shrewsbury Water-Works.—At their meeting on the 9th inst., the Shrewsbury Town Council decided to purchase the undertaking of the Water-Works Company for £40,000, subject to a mortgage charge of £6000.

Legal Intelligence.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

FRIDAY, JULY 6.

(*Before Lords Justices* JAMES, BAGGALLAY, *and* COTTON.)

In re ROBERTS, *ex parte* HILL.

In this case the appellant was a gas consumer at Coventry, who filed a petition for liquidation on March 23, 1877. A receiver was appointed on the same day, and he entered into possession on the 24th. The Coventry Gas Company, who were the respondents, had notice of the petition for liquidation and the appointment of a receiver, and on the 26th they applied to the justices for a warrant of distress for rent of gas supplied and hire of meter. This was issued on the 29th. On the same day an interim injunction was granted by the judge of the County Court of Coventry, restraining proceedings against the debtor, and subsequently an application was made to the county court judge to make the interim injunction perpetual, and to order the chief inspector of police and the gas company to deliver up the goods, which had been seized under the distress warrant, to the trustee, but the judge refused the application. The matter was transferred from the county court to the London Court of Bankruptcy, and came on before Mr. Registrar Hazlitt, who refused to continue the injunction, upon the ground that the gas company ought to be considered as landlords, and therefore they were empowered by the 34th section of the Bankruptcy Act, 1869, to distrain. The trustee appealed from that decision.

By the company's special Act, passed in 1856, the Companies Clauses Consolidation Act of 1845, the Lands Clauses Consolidation Act of 1845, and the Gas-Works Clauses Act of 1847 are incorporated with the special Act; and section 56 of the special Act provides "that all sums of money due to the company for the supply of gas, or for the price, hire, or fixing of meters or fittings, and all damages, costs, and expenses by this Act or any Act incorporated herewith directed to be paid, and the amount of which shall not be disputed, may, together with the cost of cutting off the gas, be levied by distress; and any justice, on application, may inquire into and ascertain the amount due, and issue his warrant accordingly for levying the same." Section 16 of the Gas-Works Clauses Act of 1847 provides that, "if any person supplied with gas by virtue of this or the special Act neglect to pay the rent due for the same to the undertakers, the undertakers may stop the gas from entering the premises of such person by cutting off the service-pipe, or by such means as the undertakers shall think fit, and recover the rent due from such person, if less than £20; and the costs of recovering the rent in the same manner as any damages for the recovery of which no special provision is made are recoverable under this or the special Act; or if the rent so due amount to £20 or upwards, the undertakers may recover the same, together with the expense of cutting off the gas, by action in any Court of competent jurisdiction." Section 13 of the Bankruptcy Act, 1869, enacts that "the Court may, at any time after the presentation of a bankruptcy petition against the debtor, restrain further proceedings in any action, suit, execution, or other legal process against the debtor in respect of any debt provable in bankruptcy." And Rule 260 makes a similar provision with respect to liquidation proceedings. Section 34 of the Act provides that "the landlord or other person to whom any rent is due from the bankrupt may at any time, either before or after the commencement of the bankruptcy, distrain upon the goods or effects of the bankrupt for the rent due to him from the bankrupt, with this limitation, that if such distress for rent be levied after the commencement of the bankruptcy, it shall be available only for one year's rent accrued due prior to the date of the order of adjudication, but the landlord or other person to whom the rent may be due from the bankrupt may prove under the bankruptcy for the overplus due for which the distress may not have been available."

Mr. WINSLOW, Q.C., and Mr. COLLIER appeared for the respondents, the Coventry Gas Company; and Mr. J. G. LAING in support of the appeal.

Lord Justice JAMES, in giving judgment, said he was of opinion that the order applied for ought to have been made. The 34th section of the Bankruptcy Act said: "The landlord or other person to whom any rent is due from the bankrupt may at any time, either before or after the commencement of the bankruptcy, distrain upon the goods or effects of the bankrupt for the rent due to him from the bankrupt," with a certain limitation—that is to say, the Act intended to preserve the common law right of the landlord, or any other person who had a right analogous to that of a landlord—namely, the right of distress. The landlord who had the right of going upon the property which he had demised, and of seizing the crops or goods that were there, was still to retain that right notwithstanding the bankruptcy. It seemed impossible to his lordship, upon any fair construction, to say that a gas company, selling gas to a private consumer for so many shillings per 1000 cubic feet, was an "other person to whom any rent is due" within the meaning of the section. It was impossible, he thought, to suppose that such a company, under the power of distress, would have any common law right, or any right in themselves of their own authority, to enter and seize any goods belonging to a gas consumer anywhere they could lay their hands upon them, or that if they had the common law right to seize the goods or effects of the bankrupt they would not be limited, as in the case of a landlord, to goods or effects found upon the property demised. It could not be the meaning of the Act of Parliament that a gas company, or other similar company having similar powers, would have the right of their own authority to seize the goods or effects of a bankrupt anywhere throughout the whole realm. By the Act of Parliament a remedy was provided, totally inconsistent with the notion of their having authority of their own motion, without any legal process, to seize any goods or effects of their customers for the non-payment of gas. In substance and effect, an order of the magistrates, authorizing a gas company to seize the goods and chattels of the debtor for an amount due for gas, was exactly the same thing as an order or judgment of a county court judge would be if they had sued in the county court, and obtained a judgment to be enforced by the bailiff of the county court. It seemed to him to come entirely within the clause of process and execution, and not within the 34th section. In his lordship's opinion, the goods were the goods of the trustee in bankruptcy, and the order asked for ought to have been made; therefore, the judgment of the Registrar would be reversed.

Lord Justice BAGGALLAY was of the same opinion. The Registrar, in refusing to make the injunction perpetual, proceeded on the assumption that the case came within the 34th section of the Bankruptcy Act, and that he was of that opinion was apparent by his referring to the decision in the case of *Ex parte Birmingham and Staffordshire Gaslight Company, In re Fanshawe and Jorston*, 11th Equity L.R. 615. In that case the gas company were authorized to recover the rent and charges due for gas, "by the same means as landlords may recover rent in arrear." Upon those words the Chief Judge held in that particular case that the parties came within the operation of the 34th section. Mr. Winslow, in his argument, admitted that unless the gas company were in the position of "the landlord or other person to whom rent is due," he could not support the order that had been made. It seemed to his lordship impossible to hold that, in the present case, the gas company were parties to whom rent was due. No doubt, by the Gas-Works Clauses Act, 1847, and the special Act in this case, the company had the power of recovering rent or rates that might be due to them for gas supplied, and there was a proceeding by distress in the manner pointed out by those Acts; but that was only a mode of proceeding for the purpose of obtaining the amount due. It appeared to his lordship to be simply and solely in the nature of a proceeding for the purpose of enforcing the amount of debt due, and to fall, therefore, within the operation of the 13th section, and not the 34th section, and, therefore, the view taken by the registrar was not the correct one.

Lord Justice COTTON was of the same opinion. The only difficulty really was, whether or not a gas company was an "other person to whom any rent is due" within the meaning of the Act. His Lordship thought that the real reason for putting in those words, "or other person," was to prevent any difficulty arising as to whether another person could be dealt with strictly as a landlord. He was of opinion that a gas company was not a landlord within the meaning of that section, and that gas-rent was not rent within the meaning of that section. That section referred only to people standing in the position of landlords, "rent" only being rent payable from one person to another in the relation of landlord and tenant. The rent referred to in the 34th and 35th sections was a rent payable in respect of a tenancy.

Their Lordships allowed the appeal with costs, including the costs in the Court below, and also the costs of the injunctions.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

Abstract of the Report of Professor Williamson, F.R.S., the Chief Gas Examiner to the Metropolitan Board of Works, on the results of the daily testings of the gas supplied by The Gaslight and Coke Company, the South Metropolitan Gas Company, and the Commercial Gas Company, during the quarter which ended on June 30, 1877:—

Illuminating Power in Standard Sperm Candles.

Description of Gas and Testing-Place.	Max.	Min.	Aver.
The Gaslight and Coke Company—			
Common gas, Beckton	17·8	15·9	16·9
" Ladbroke Grove	17·2	16·2	16·8
Cannel gas, Millbank Street	22·0	20·0	20·7
Common gas, Devon's Road	18·4	16·1	17·3
" Carlyle Square	19·3	16·4	17·5
" Camden Street	17·6	15·8	16·5
" Graham Road	19·4	11·6	18·0
South Metropolitan Gas Company—			
Common gas, Hill Street	19·8	15·5	17·3
Commercial Gas Company—			
Common gas, Wellclose Square	17·0	15·6	16·2
" Parnell Road	18·0	15·0	16·3

The average illuminating power at all the testing-stations has been above the requirements of the Acts of Parliament. At two stations only have there been deviations for a single day from the official minimum—the one at Beckton, of 0·1 candle power, and the other at Graham Road, amounting to 2·4 candle power.

Sulphuretted hydrogen has not been present at any of the testing-stations during the past quarter. The proportions of sulphur present in other forms than sulphuretted hydrogen were as follows:—

Grains of Sulphur per 100 *Cubic Feet of Gas.*

Description of Gas and Testing-Place.	Max.	Min.	Aver.
The Gaslight and Coke Company—			
Common gas, Beckton	12·2	7·4	9·7
" Ladbroke Grove	17·0	10·9	13·0
Cannel gas, Millbank Street	21·3	12·0	16·2
Common gas, Devon's Road	15·2	5·7	9·6
" Carlyle Square	22·7	8·4	11·6
" Camden Street	19·1	8·6	11·8
" Graham Road	22·4	8·9	14·1
South Metropolitan Gas Company—			
Common gas, Hill Street	26·4	5·6	14·4
Commercial Gas Company—			
Common gas, Wellclose Square	37·1	5·8	22·1
" Parnell Road	30·0	8·3	12·9

At all the stations the average quantities of sulphur have been considerably below the quantity allowed by the Acts, but at several of the stations an excess of sulphur has occasionally been present. At Millbank Street there was a slight excess on the 30th of April and the 1st of May, due to the inevitable disuse of a set of lime purifiers during the repairs necessitated by the fracture of a main. At Carlyle Square the quantity of sulphur only once exceeded the official maximum, and at Graham Road twice. The returns from Hill Street show five cases of excess of sulphur—viz., 25·6, 25·5, 26·4, 23·0, and 24·8 grains per 100 cubic feet. At Wellclose Square the returns show an excess of sulphur for several days in the beginning of May, after which there was, for some time, an improvement in the purification. At the end of May, however, and the beginning of June, there was again a slight excess; but a steady improvement in the purification then took place, by which the sulphur was brought down by the end of the month to about 8½ grains per 100 cubic feet.

At most of the stations ammonia, when present at all, has been in very small quantities; but at the stations of the Commercial Gas Company the quantity of ammonia has become, during the latter part of June, considerably greater than allowed by the Acts of Parliament.

METROPOLITAN BOARD OF WORKS.—At the meeting of the Board on the 13th inst., Mr. Henry Leicester Greville was appointed gas examiner, under the provisions of The Gaslight and Coke Company Act, 1876, at the testing-place fixed by the Gas Referees in Graham Road, Dalston, at a salary of £100 per annum, in the place of Mr. M. J. Salter, resigned. The Special Purposes Committee presented a report in which there was a recommendation to the effect that the charge of 18s. per lamp made by The Gaslight and Coke Company for lighting, extinguishing, cleaning, repairing, and painting the street-lamps upon the Victoria Embankment, in lieu of 15s. formerly paid, should be agreed to.

Dr. Stevenson's report on the gas supplied by The Gaslight and Coke Company to the Vestry of St. Pancras, during the month of June:—Maximum light, estimated by sperm candles, according to the Act—17·1. Minimum light, sperm candles—16·1. Average light, sperm candles—16·5. Traces of ammonia, indicated by turmeric test-paper—Traces only on all occasions. Traces of sulphuretted hydrogen, indicated by lead test-paper—none on any occasion. Sulphur, 11·42 grains per 100 cubic feet.

METROPOLIS WATER SUPPLY.

The Registrar-General publishes the following returns of the average daily quantity of water supplied by the London Water Companies during the month of June, 1877. According to these, 132,570,858 gallons, or 602,330 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight), were supplied daily; or 248·5 gallons (112·9 decalitres) rather more

than a *ton* by weight, to each house, and 35·0 gallons (15·9 decalitres) to each person, against 33·0 gallons during June, 1876.

Companies.	Number of Houses, &c., supplied in June, 1876.	Number of Houses, &c., supplied in June, 1877.	Aver. Daily Supply of Water in Gallons* during June, 1876.	Aver. Daily Supply of Water in Gallons* during June, 1877.
Total supply	526,541	533,440	123,192,817	132,570,858
From Thames	248,181	250,780	63,824,721	67,349,512
,, Lea and other Sources	278,360	282,660	59,368,096	65,221,346
THAMES.				
Chelsea	28,675	28,741	8,109,400	8,554,000
West Middlesex	48,116	49,372	10,834,702	11,993,533
Southwark and Vauxhall	80,498	78,297	19,560,200	19,120,000
Grand Junction	36,616	37,683	12,166,819	12,588,979
Lambeth	54,276	56,687	13,153,600	15,093,000
LEA AND OTHER SOURCES.				
New River	124,323	125,261	26,653,000	29,254,000
East London	109,375	111,967	24,984,000	27,642,400
Kent	44,662	45,432	7,731,096	8,324,946

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for June, 1877, as compared with that for the corresponding month of 1876, shows an increase of 6899 houses, and a increase of 9,378,041 gallons of water supplied daily.

Dr. Frankland reports, as the result of his analysis of the waters supplied to the Metropolis and some of its suburbs during June, that, taking unity to represent the average amount of organic impurity in a given volume of the Kent Company's water during the last nine years, the proportional amount of such impurity in an equal volume of water supplied by each of the other companies, and by the Tottenham Local Board of Health, was:—Tottenham 0·4, Colne Valley 0·6, New River 1·3, Kent 1·4, Grand Junction 2·5, West Middlesex 2·6, East London 2·9, Lambeth 3·1, Chelsea 3·5, Southwark 4·1. The river waters delivered by the Chelsea, West Middlesex, Grand Junction, Lambeth, and East London Companies were all efficiently filtered, and contained about the average summer proportion of organic impurity. That delivered by the New River Company was also efficiently filtered, and contained a remarkably small proportion of organic matter. On the other hand, the Southwark Company's water was slightly turbid from inefficient filtration, and the suspended matter was full of moving organisms. It also contained a much larger proportion of organic impurity than was found in any of the other metropolitan waters. The water supplied, from artesian wells, to the inner circle, by the Kent Company, and to the outer circle by the Colne Valley Company and the Tottenham Local Board of Health, was bright, sparkling, and of most excellent quality for dietetic purposes. The Colne Valley water was also soft, and suitable for washing. Seen through a stratum 2 feet deep, the Kent, Colne Valley, and Tottenham waters were clear and colourless; the New River, clear and very nearly colourless; the East London, Lambeth, and Grand Junction clear and very pale yellow; the West Middlesex and Chelsea clear and very pale brown; and the Southwark turbid and brownish.

Results of Analysis expressed in Parts per 100,000.

Companies or Local Authorities.	Total Solid Matters.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen, as Nitrates and Nitrites.	Total combined Nitrogen.	Chlorine.	Total Hardness.
Inner Circle.								
Thames—								
Chelsea	26·94	·186	·018	0	·218	·236	1·60	18·9
West Middlesex	26·40	·133	·018	0	·202	·220	1·60	18·4
Southwark and Vauxhall	27·14	·217	·027	0	·188	·215	1·60	19·7
Grand Junction	27·20	·122	·024	0	·179	·203	1·60	19·1
Lambeth	29·60	·156	·024	0	·196	·220	1·70	20·3
Other Sources—								
New River	25·96	·065	·009	0	·224	·233	1·60	19·4
East London	27·08	·150	·023	0	·189	·212	1·75	19·4
Kent	43·14	·066	·014	0	·459	·473	2·48	28·7
Outer Circle.								
Colne Valley	15·50	·033	·004	0	·353	·357	1·35	7·3
Tottenham Board of Health	46·64	·016	·009	0	·475	·484	3·20	27·1
Corporation of Birmingham*	24·38	·333	·054	·002	·153	·208	2·00	15·6
Corporation of Glasgow†	3·20	·163	·011	·000	·004	·015	·72	·95

* Analyzed by Dr. Alfred Hill, Medical Officer of Health and Analyst to the Borough.
† Analyzed by Dr. E. J. Mills, F.R.S., of the Andersonian University, Glasgow.

Note.—The numbers in the analytical table can be converted into grains per imperial gallon by multiplying them by seven, and then moving the decimal point one place to the left. The same operation transforms the hardness in the table into degrees of hardness on Clark's scale.

The following are the returns of the Society of Medical Officers of Health, on the composition and quality of the metropolitan waters in June, 1877:—

Names of Water Companies.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen. As Nitrates, &c.	Ammonia. Saline.	Ammonia. Organic.	Hardness (Clarke's Scale). Before Boiling.	Hardness (Clarke's Scale). After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	18·40	0·050	0·129	0·001	0·008	11·0	4·2
West Middlesex	17·70	0·054	0·129	0·000	0·007	12·6	3·3
Southwark and Vauxhall	18·90	0·064	0·108	0·001	0·009	12·6	3·0
Chelsea	18·80	0·076	0·090	0·002	0·009	13·2	3·3
Lambeth	19·90	0·074	0·150	0·000	0·008	13·2	3·7
Other Companies.							
Kent	28·70	0·003	0·450	0·000	0·002	19·4	7·0
New River	18·20	0·033	0·150	0·000	0·006	12·6	3·3
East London	17·80	0·047	0·090	0·000	0·007	12·0	3·0

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid, namely:—Grand Junction, Southwark and Vauxhall, and Lambeth. C. MEYMOTT TIDY, M.B.

BIRMINGHAM WATER SUPPLY.—Dr. Hill, the Medical Officer of Health for Birmingham, reports that the water supplied to the town exhibited a large amount of organic impurity during June, due largely to imperfect filtration, as proved by its turbidity and the presence of vegetable fibres.

BRITISH ASSOCIATION OF GAS MANAGERS.

(*Concluded from page* 61.)

WEDNESDAY, JUNE 13.

Mr. J. ELDRIDGE (Richmond) read the following paper on

ECONOMY IN CARBONIZATION BY THE USE OF WEST'S STOKER.

West's system has been rather prominently before this Association for the last year or two. Mr. West read a paper on it at our meeting in London in 1874. He spoke about it at Leeds in 1875, and our President read an able paper on the subject at our last meeting in London. I ought perhaps, therefore, to apologize for bringing it forward again; but I am induced to do so from its great importance, and also from the fact that very many gas managers appear to be much interested in the matter, and are making inquiries as to its working results. This, I think, will justify my occupying your attention for a short time. Others could have done so much more ably than I can hope to do, but as my company were the first, after the Maidstone Company, to put Mr. West's system into use, I thought it desirable that I should give the results of our working, as what you have heard before is simply the result of Mr. West's own working. I have now had the system in operation about eight months, and for the last ten weeks have used no other.

Mr. West claims for his inventions and system of working the following most important advantages:—Increased volume of gas; increased make per mouthpiece; increased bulk of coke; reduction in labour, and less dependence on skilled stokers.

Mr. West has clearly proved that in his own works these claims have been substantiated, to an extent even beyond his most sanguine expectations. Has this arisen in his case from that careful and watchful management which he would, as a matter of course, bestow upon it, anxious as he must be for the success of his own scheme? and the important question is, can other managers produce the same results?

I shall now proceed to answer that, so far as my own company and works are concerned.

Previous to our commencing with it, we were using the ordinary 16-inch round retorts, 20-feet throughs, and some few 15-inch rounds. As a rule, the 16-inch rounds took three scoops, or about 2¾ cwt., of coals in each six-hour charge.

Mr. West recommends, as the most suitable for his stoker, D-retorts, 21 inches by 15 inches. We commenced with 36 of these, about the middle of October, and worked in conjunction with rounds till we came up to 106, in mid-winter.

Only working such a small proportion of retorts upon the new plan, I could not tell much about actual results, financially or otherwise, till the winter was nearly over; still we had pretty clear indications, from our additional make per mouthpiece and higher illuminating power, that the 36 new retorts were telling. It was not till the middle of April this year, when we were working with the new ones only, that I was able to compare our working of 1877 with that of 1876. I will now give you our figures.

Week ending April 8, 1877, we made 80,000 cubic feet more gas than in the corresponding week of 1876, with 13 retorts less in action; April 22, 148,000 feet more, with 20 retorts less; April 29, 110,000 feet more, with 20 retorts less; May 5, 164,000 feet more, with 13 retorts less; May 5, 123,000 feet more, with 12 retorts less, with, as a matter of course, a corresponding reduction of wages, wear and tear, &c.

It may be we ought to have done better in 1876. I can only say we did the very best we could then, as well as in 1877. I can only compare with our own working of each year, and not with that of others.

These few simple extracts from our carbonizing-books are enough to show that, had we made the whole of our gas last winter by the new process, many less retorts might have been used, and consequently less cost incurred for wages, wear, tear, &c.

I will now give you a few more details of our actual working.

April 23.—Thirty retorts for 12 hours, using 9 tons 1 cwt. of Liversedge coal, made 95,700 cubic feet, being 10,200 feet per ton, and at the rate of 6380 cubic feet per mouthpiece in 24 hours.

April 24.—Nine tons of Newton Chambers gas coals, with 30 retorts for 12 hours, made 10,330 cubic feet per ton at the rate of 6200 per mouthpiece in 24 hours.

April 25.—Ten tons of coals of Newton Chambers and New Pelton in about equal proportions, in 36 retorts for 12 hours, made 108,000 cubic feet, at the rate of 10,800 per ton, and 6000 per mouthpiece in 24 hours.

These were all four-hour charges, and without cannel. Illuminating power in all cases being from 15 to 16 candles.

Previous to our using West's system, we used to get in the ordinary working of six-hour charges from about 4500 to 5000 per mouthpiece, and about 9600 per ton, according to coals and other circumstances.

I will now give you one more statement of figures of an experiment made on the 15th of May, in the presence of a large number of gas friends. On this occasion we used 9 tons of coal—viz., 6 of New Pelton, and 3 of Newton Chambers—in 30 retorts, for 12 hours. We made 99,000 cubic feet, being 11,000 cubic feet per ton, and at the rate of 6600 per mouthpiece in 24 hours, four-hour charges of exactly 2 cwts. of coals in each charge.

The illuminating power of the gas during the whole time scarcely varied from 15·5 candles; no cannel used at all. We made from this 9 tons of coal 13 chaldron of good coke of 36 bushels, carefully measured, or equal to 52 bushels of coke per ton of coals.

These results are certainly remarkable, and without going into the chemistry of the subject, I may say that they are consistent with experience, for we all know that the quantity of gas producible from a ton of any coals is dependent, within certain limits, upon the conditions under which the coal is carbonized. If the layer of coal in the retort be very thin and even, and the temperature sufficiently high to carbonize the coal in a very short time, a much larger quantity of gas is produced than when a sample of the same coal is carbonized in a thick and irregularly laid mass, and a longer time occupied in working it off. This fact is especially well known to those managers who are in the habit of ascertaining the relative value of coals by carbonizing a few pounds experimentally at a time. Nor is this all, for experience also proves that the illuminating power is greater, while the sulphur compounds, which are so difficult to remove, are less in gas produced under the first-named conditions. With the system under consideration we have as near an approach, I believe, to experimental production as is consistent with due regard to practical necessities.

With regard to the question of illuminating power, till we had West's system in action the returns made by the gentleman who tests for our parish authorities seldom ranged higher than about 14 candles, and that with the rather free use of cannel; but now, as a rule, the returns from him range from 14·80 to 15·20, without the use of cannel. I attribute this to the coals being broken small, four-hour charges, and the coals being evenly spread over the retorts.

Many are inquiring as to the quality of the coke made in the new way. Being in thinner layers in the retort, it is lighter than that made in the old way of six-hour charges, and is in smaller pieces, but is of good quality. I may say here that we have an excellent coke trade. We supply the Royal Gardens at Kew, and other places, where they are very

particular, and we have never had a complaint; it burns more freely, and, consequently, is more suitable for domestic purposes, and will, I believe, come more fully into use than coke made in the old way, and so realize an increased income to our companies.

Another most important matter is, the independence which a manager feels with regard to stokers, &c. Any person who can wheel a barrow, can work this machine. I am thankful to say we have never had any trouble with our men in this respect; but if we should, there would be no difficulty, and I may state that our stokers are delighted with the change. Sometimes we have had to stop the machine for a day or two, and then the general remark among them has been, "We shall be glad to get the iron man going again."

I have seen our men draw and charge 18 retorts in 15 minutes; but, as a rule, it will be about one minute per retort. The man with the rake will generally draw the charge of coke with one pull in a very few seconds, leaving none in the retort. He pushes his machine on to the next one, and the man with the charger follows directly, and in goes the coal in a few seconds, and the lid is closed. This rapid drawing and charging is one of the principal causes of success.

Again, in a humane point of view, the matter commends itself to our attention, and I may say to our sympathies. We must all admit that stoking upon the old plan is most trying to our poor fellows; I think we must conclude that by it many of them have had their days shortened. We see them lifting their heavy rakes and standing up close to the hot retorts, trying to get out the last bit of coke, and we all feel that something is to be desired which would relieve them from so severe a tax on their physical powers.

With the new plan I can only say, so far as we are concerned, while our men are getting more money, their labour is much less, and the exposure to heat so reduced as not to be the least trying.

I believe that any man who has brought about such a change as Mr. West has done in this respect, deserves the best thanks of all connected with the manufacture of gas.

I have been accustomed for years to test for sulphur, not, of course, in the scientific mode in which a professional chemist would perform his task, but in a manner sufficiently accurate for our manufacturing purposes. Without unnecessarily dwelling upon figures, as to the quantity in our gas, either in the past or present, I can only say that, since West's system has been in use the sulphur has been reduced 40 per cent.

Another remarkable fact worth noticing is that, when we open the lids of the retorts at the expiration of four hours, there appears to be no gas left, no flame to be seen, and yet, although the coals are so completely drained from gas, the illuminating power is maintained.

All the coals are broken up by the aid of a compact and efficient breaker, and as reduced coal must be used, the system gives a good opportunity for using nuts, small coals, &c., if a manager is so disposed, and if he can really get them good, he can do so with great advantage.

I may say that we use none but Morton's lids, and I cannot speak too highly of them; they add to our economy, cleanliness, and rapidity of charging.

Had Mr. West been addressing you to-day, instead of me, he would possibly have shown more striking results than I have now brought before you; but in dealing with the subject, I have given you just the results of my own working, without regard to the interest, opinions, or experiments of any one else, and now leave the matter to your consideration.

Mr. PRICE (Hampton Wick) said the experiment referred to in the paper he could bear testimony to with great satisfaction, having seen the ease and facility with which the men performed their work, as compared with the labour required under the old systems of carbonization. It had been stated that 6300 feet of gas per mouthpiece was obtained by this method, and they all knew that, in the ordinary plan of working, with circular retorts, 15 inches diameter and 9 feet long, they could only obtain 4000 feet with difficulty. He had heard, since he had been at the meeting, that even 7000 feet had been obtained under West's system. If such results could be secured with comparative ease to the workmen, it must be a great satisfaction to managers. The object, he presumed, of every manager was to obtain the maximum amount of work with the minimum amount of labour, and it appeared to him that the adoption of this system was an important step in that direction. There were difficulties in connexion with it which would, no doubt, be overcome in a short time. With existing stacks, managers who had not much money to deal with would go on working with their old plant till it was exhausted, and they required new. He was persuaded that, if they had then seen this system at work, they would not go back to the old method, so that in time he expected to see that West's system of carbonization was the rule, and not the exception, in gas-works.

Mr. H. P. STEPHENSON (London) said there was one point upon which he should like, if Mr. Eldridge felt at liberty to speak upon it, to ask for information. The question of sulphur compounds was attracting a great deal of attention at the present time, and he thought if it was found that West's system had the effect of reducing the sulphur compounds in the gas, it would be a most important element in its favour. He should like, therefore, to know from Mr. Eldridge, both as regarded Richmond and Maidstone, what methods of purification were adopted, and what the relative amounts of sulphur compounds were found to be under the old and under the new systems—the number of grains in each instance. In all probability if the sulphur compounds were considerably decreased under the new system, it was due, in a great degree, to the four-hour charges. He thought it was most satisfactory to the members to receive from Mr. Eldridge the further information he had given in reference to the working of the system, towards which they had all been looking with much interest for some time past. It must be remembered, in judging of the results recorded, that the retorts were probably all new, and that the retorts in use last year were old ones. Perhaps Mr. Eldridge would tell them the relative condition of both. As to the high make per mouthpiece, it must also be remarked that, under any circumstances, the make would always be higher with four-hour charges.

Mr. HEPWORTH (Carlisle) said Mr. Eldridge's paper had certainly interested him very much, and the details he had given them of his own working had no doubt afforded the meeting generally very much gratification. Every member of the Association had been watching with interest all improvements in machinery which promised to dispense with manual labour in the retort-house. There were two matters arising out of the paper which it struck him it would be useful to obtain information upon. The first had reference to the cost of labour under West's system. He took it that the expense was materially reduced, and he would like to know to what extent. The second point was the cost of wear and tear, and of renewal. It would also be interesting to know the size of these retorts in comparison with the 16-inch retorts with which he was previously working.

Mr. WOODALL (London) asked the number of retorts in use in which the saving of 148,000 cubic feet was effected, as compared with the same period of the preceding year, because 148,000 feet per week might be a large quantity over a small number of retorts, but would not be over a large number. It worked out 17,000 feet per day, and he would like to know the per centage of retorts saved instead of the simple number of retorts. The question that Mr. Stephenson referred to—as to the age of the retorts, was also a very important one. They all knew the great difference in results with retorts in excellent condition and well set, and others which had been in use for some time previously. The question put by Mr. Price was hardly one that would be of much moment. He thought the Association had every reason to be grateful to Mr. Eldridge for giving them his paper, with the very interesting details it contained, and, for himself, he confessed that he began to feel very differently towards the system to what he did two years ago. His opinion formerly was that the light character of the coke would be so much against the system as to be a serious barrier to its adoption. He had no doubt in a town like Richmond, where the consumption was large amongst householders, the coke produced by this system was eminently well suited; but for harder work, such as for furnaces, &c., it must, he should say, be inferior to the coke which had been burned for two hours longer. He would like to know whether it had been tried in a retort-house with a stage, because he feared that the coke, being so much lighter, would be liable to be broken up, and give a rather large per centage of breeze.

Mr. GANDON (Sydenham) asked what space in front of the retorts was required. It appeared to him that in using Mr. West's machine a much larger space would be required than with the ordinary method of working. The advantages described by Mr. Eldridge seemed to be attributable, first to the use of the machine, and next to light charges. Therefore, where the machine was not in use they might obtain some of the advantages by adopting the plan of light charges.

Mr. PARLBY (Sheffield) asked what quantity of gas per man was made by this system, and whether the coke produced would be suitable for furnaces. The latter was an important point with some companies who supplied coke principally for manufacturing purposes.

Mr. GODDARD (Ipswich) said, having had 35 years experience in gas-making, he was looked upon by some gentlemen in the profession as antiquated and old-fashioned. At the same time, he had always had his attention directed to every method and instrument devised, having in view economy in the carbonization of coal. In the construction of his new retort-house he had made provision for the introduction of West's stoker. As yet he had had it at work for only a short period; but, so far as his experience went, he had every reason to be thoroughly satisfied with it. The facility of working was so great that the men, who generally had preconceived notions about novelties, had readily fallen into its use, finding that it not only lessened their labour, but increased their comfort. With regard to coke, he might say that at Ipswich a great deal was used for malting purposes, and that produced by the mechanical stoker had given as much satisfaction to the customers as that obtained under the old process of carbonizing coal in the manufacture of gas. He had very great confidence in the machine, and believed it would result in a considerable saving both in wear and tear, and in the working of the concern generally. He gave to it his most cordial support, and would be very glad to see it more generally adopted.

Mr. STOUT (Boston) said by the kindness of Mr. Eldridge he was permitted to witness some experiments with this apparatus on the 15th of May. He might say that he went to Richmond, not perhaps thoroughly prejudiced against the system, but with certain preconceived notions which were not altogether favourable to it, but he was so far open to conviction that if he found the thing a success he was willing to be bound by the results. He confessed that so far as the production of gas was concerned he never saw anything like it. With 15-inch retorts he could only himself get 4000 feet per mouthpiece; but at Richmond he was surprised to see the station-meter going at the rate of 9000 feet per hour. As to the coke, it was as good as that produced with six-hour charges, and for domestic purposes he should think its quality was better. The coke produced in his own works was a large hard coke, and was used principally for malting purposes, being rather too hard for domestic use, but he was thoroughly convinced that the coke he saw at Richmond was a good saleable article, and would serve to keep up the heats in a furnace. He thought West's system, wherever brought into play, must result in a very large reduction of expenditure, and an increase of income. As compared with some other members of the Association, the works under his own care would be considered small, but he would not hesitate for one moment in asserting that, if he had this system fairly in operation, he could accomplish the same result as Mr. Eldridge had done, and he should not doubt that he could make more than £1000 a year profit every year it was in action. He believed he could save £200 a year in fuel, £60 in renewal of retorts. He should be able to buy his coals at 2s. per ton less, which, on a consumption of 5000 tons, would be £500, and he should be able to obtain 1000 feet of gas per ton extra—equal to £375—making a total of £1135. He looked upon the invention as likely to effect a thorough revolution in gas manufacture.

Mr. G. E. STEVENSON (Peterborough) said there was one point upon which he was still ignorant—though, no doubt, the information was attainable—and that was the number of men required to work one charging and drawing apparatus. He might remark also that no one yet, so far as he remembered, had taken notice of the fact that it was not impossible to make four-hour charges upon the old plan, either by shovel or scoop; nor was it impossible to produce 6000 feet of gas per mouthpiece. They all knew that Mr. Watson, of the Crystal Palace District Company, made 6500 feet, with six-hour charges regularly. He (Mr. Stevenson) had been on the Continent, and knew that in Germany it was frequently the case that with charges of four hours duration—light charges, and the coal equally distributed over the bottom of the retort—the results were as good as those claimed to be produced under West's system. At the works at Dessau they produced regularly, out of a setting of six oval retorts 8½ feet long, 45,000 to 50,000 feet of gas per day, averaging 7000 feet per mouthpiece, with four-hour charges. The heats were very high, and the charges were worked off quickly. The sulphur impurities were extremely low, as, indeed, was the case in most continental gas-works.

Mr. STOUT: What coals employed?

Mr. STEVENSON: Prussian—coal from the Rhine. It was the same thing at the works of the Paris Gas Company. The sulphur compounds never exceeded 10 grains per 100 feet. This was tested in Berlin by the official tester, and he never found more than that quantity. With the apparatus now exhibited, he (Mr. Stevenson) believed that the high results per mouthpiece and per ton could be more easily obtained than by the ordinary system. He thought that British coal, though yielding more gas of good quality than Prussian, did not work off so quickly. He considered that he obtained very high yields per ton at his own works, but they did not exceed 4500 feet per mouthpiece.

Mr. CARPENTER (Sheerness) had been at Maidstone, and seen the men at work under Mr. West's system. He found seven beds of retorts going, and four men and one boy were employed for the purpose. It struck him that the labour required was very light. The heats were good, the coke was good, and the whole of the gas was thoroughly evolved from the coal. He examined the coke outside, and found no great per centage of breeze amongst it. Therefore he considered the system was a step in advance.

Mr. PATERSON (Rochdale) thought he was right in saying that West's system was more an application of an apparatus to the charging of retorts, and that the results obtained did not pertain exclusively to the system.

Of course, it was easily understood that the work was done more easily with an apparatus of that description, and that it was a clean and handy way of doing the work of charging. But he thought it was open to question whether all the advantages claimed in the paper just read were due exclusively to the adoption of it. He could understand that, with four-hour charges in ordinary retorts, they could undoubtedly get a larger yield of gas per mouthpiece than with six-hour charges, consequently the comparison that had been made between the yields per mouthpiece was scarcely correct. Of course, the yield per mouthpiece was due, to some extent, to the larger size of the retorts employed. There was also the question of greater carbonizing power in the same furnace; consequently labour was reduced, but that was not an advantage peculiar to West's system, but might be done by hand as well. The next point that occurred to him was the question of sulphur. If light charges reduced the sulphur compounds to the extent of 40 per cent., it was certainly a startling result. If it was the case, it would be interesting to know what was the cause of the reduction. Was it by maintaining a more regular heat upon the coal, or, in other words, was it by the more rapid discharge of the gas and the shorter period it was kept in the retort? or was it due to some other cause? Then he would ask whether the writer was quite satisfied that the purifying arrangements were precisely the same in both cases, and also that the coal employed was exactly the same. Of course, he did not mean to ask whether the coal came from the same pit, but whether any special means were taken to ascertain that the coal was the same in both cases. In conclusion, he could only say that he thought their friend, Mr. West, deserved the best thanks of all gas managers for the attention he had given to this question.

Mr. Newbigging (Manchester) said he thought, with previous speakers, that they were all exceedingly obliged to Mr. West for the persistent manner with which, year after year, he had brought his invention before the meetings of the Association. He thought that before Mr. West introduced his system of drawing and charging there was, perhaps, more prejudice shown towards the notion of mechanical stoking, and the idea of applying steam or hydraulic power to such purposes, than to any other system. Mr. West's plan, however, was much simpler in character; indeed, they had been apt to look upon it as rather insignificant. But it appeared to him that it was gaining ground from the very satisfactory results recorded as being obtained by it. He quite agreed with Mr. Paterson that all the excellent results mentioned in the paper, and by previous speakers, were not entirely due to Mr. West's system of working. He had long been of opinion that the sulphur question might be entirely solved by the adoption of four-hour charges, and the employment of very high heats. On the Continent, for years, that plan had been adopted, not only with Prussian coals, but with coals imported from England. It was well known that the sulphur compounds were given off during the latter hours of the charge. The results obtained abroad were something like 7000 or 8000 feet of gas per mouthpiece, something like 9 or 10 grains of sulphur per 100 feet, and something like 10,000 feet and upwards per ton of coal. But along with similar results, which were evidently obtained by the system explained to the meeting by Mr. Eldridge, there was also the saving of labour. Now, if all these advantages were really associated in West's system, they ought to give him all the encouragement in their power by adopting it, at all events to some extent, so as to be able to verify his claims by personal experience. With reference to an inquiry made by a previous speaker, he might express an opinion that there could be no objection to the use of a stage floor in connexion with this system, so far as the falling of the coke an extra distance was concerned. The coke being of a light specific gravity, it would not be so liable to breakage as coke of a heavier character.

Mr. Mead (Chelmsford) asked for the actual dimensions of the retorts employed under the old and new systems.

Mr. Graham (Middleton) said at a considerable number of works in the North of England they worked four-hour charges. He had himself adopted the plan for five years, and he could quite bear out what had been said on the point. The purifiers had run much longer; there was a less amount of sulphur compounds, more gas, and good coke. There was one question he would like to ask; it was this: The main objection to West's system, as he understood, was with reference to the carriage used in the retorts. Did this carriage ever jam or lock or get wedged in the retorts? And had it not a tendency sometimes to crack up the retorts?

Mr. Hartley (Westminster) had only a few words to say, but a very important question had been raised by Mr. Stephenson and other gentlemen —viz., the presence and per centage of sulphur compounds in the gas. It was often easier to discover effects than to account for their cause, and gas managers were somewhat in this position with regard to the sulphur question. Were it not that he knew that it had been disputed of late whether or not the obscure sulphur compounds were produced in the latter part of the time of distillation, he should adhere strongly to the old theory, and say that such compounds were due mainly to the prolonged distillation of the coals. But certain experiments had been made which, he understood, tended to throw a doubt on the old theory—he did not say to upset it, because only a few days previously a most eminent chemist had told him that he still most decidedly adhered to it. By West's system the gas was produced much more rapidly from the coal, and he (Mr. Hartley) believed that a much larger proportion of sulphur was driven off as sulphuretted hydrogen than on the usual system, and this could easily be taken up at little cost by oxide. He had made it his business to determine for himself what were the relations in the per centage of sulphur in gas manufactured upon the old system, and that produced under the new, each being purified by oxide. He had not the figures with him, but he was able to corroborate the testimony of Mr. Eldridge, that the reduction under the new system was fully 40 per cent. He held in his hand a copy of a document issued by the borough analyst of Maidstone, which showed that in the previous month the sulphur in the Maidstone Company's gas averaged 13·25 grains per 100 cubic feet, and that in the month of April it averaged only 13·21 grains. He ought, however, frankly to state that since last month the quantity of sulphur had risen very considerably. A different description of coal had lately been used to that which had been employed for some time previously, and, as coals differed somewhat in composition, and in the results they gave on distillation, it might be that this new coal yielded a larger proportion of bisulphide of carbon than that formerly employed. With respect to the high heats and large yield per ton and per retort on the Continent, he was not surprised at what had been stated, but what about illuminating power and purity? There was another point in connexion with West's system which was of interest, and that was that it made gas managers more independent of skilled labour, whilst it lessened the tax on the men who had the work to do in the retort-house, and diminished the number required. It was all very well to talk of four-hour charges on the old system, but what would be the results? Simply an increase instead of a reduction in the number of men employed. It had been suggested by one speaker that a great portion of the advantages claimed for West's system was due to the reduced condition of the coal. He (Mr. Hartley) admitted it, but he must add that they could not deal with reduced coal by any other means so well as they could by West's apparatus, nor could they put their coal into the retorts in a manner so favourable for distillation. To obtain the best results from reduced coal it was necessary for it to be broken immediately before being put into the retorts, this was cheaply done by Mr. West, and, finally, the charging and drawing were effected at a much lower cost, he (Mr. Hartley) believed, than had ever yet been attained by any other system whatever.

Mr. Magnus Ohren (Sydenham) said, with reference to the statements of some previous speakers as to the amount of sulphur compounds in the gas of foreign companies, he might inform the meeting that in connexion with a recent parliamentary inquiry, Messrs. Heisch and Wigner were sent over to Paris by the Metropolitan Board of Works to test the gas supplied by the Paris Gas Company, and their evidence was that it contained 15 grains of sulphur per 100 cubic feet.

A Member asked whether the coal employed was nuts or large Silkstone broken up specially for the purpose.

Mr. West (Maidstone) said the members present must be sure that he was very pleased and gratified that other engineers had now given the Association the results of their experience of his apparatus. Seeing that the system was now at work in two or three places, he felt very much disposed to leave the matter without any remarks of his own, feeling certain that, notwithstanding any difficulties that might interpose, he should at some future day be congratulated upon its entire success. But there were one or two remarks, arising out of questions that had been asked, which he should like to make on this occasion. And first, with regard to the question of coke. He did not think there need be any fear about that. The consumption of fuel in the furnace could be judged from the fact that he sold 32 bushels of coke per chaldron. He had had a more ready sale for coke since the adoption of this system than previously. His retorts were now charged with over 2¼ cwt., and that was enough to satisfy the meeting that the coke could not be so light and friable as some supposed. As to the extra volume of the gas, no doubt that was obtained by breaking up the coal and evenly distributing it over the whole bottom surface of the retort. On the old system that could not be done. The make of gas was about 47,000 feet per man. He had now 27 retorts at work; they made 96,000 feet of gas per 12 hours, and the machine was worked by two men and one boy. The question of wear and tear was important. He was convinced that it was less than when the scoop or shovel and ordinary rake were employed. He was now using retorts which had been in about two years, and they were still going on. Many of the difficulties which he himself conceived would arise from the working of the wheels, forming grooves in the retort-floors, had not been realized. The more he worked the system the better he liked it, and every day he got better proofs of its effectiveness. The labour question was a most important one, and it could be clearly proved that all the advantages he claimed in this respect were realized. He would be pleased for any gas managers to visit his works, and judge of results for themselves, and if they chose to handle the works for a day or a week, they might do so. His own carbonizing books for last year showed that he had done well under the system, and that in every respect there was an improvement.

Mr. Eldridge, in reply, said he was much obliged to Mr. Price for the remarks he had made upon the paper. Mr. Stephenson asked how many grains of sulphur were present per 100 cubic feet in gas manufactured on West's system. As he (Mr. Eldridge) remarked in his paper, he did not wish to dwell on figures. Like most companies regulated by Act of Parliament, the Richmond Company were limited to 20 grains, and in their past history they had scarcely kept so low as that, and had frequently been as high as 35 or 40 grains. He could answer for it that under West's system the sulphur was now very much reduced. With regard to the mode of purification, he might state that on the bottom tier of the purifiers they used lime, and above that were four tiers of oxide of iron. There had been no variation in the system of purification since the adoption of West's system. As to the cost of labour, as he had only had the system in operation for ten weeks by itself, he could hardly make a comparison, as he could do if it had been at work for six months. But though he could not give exact results, he was prepared to state that there was a great reduction in the labour cost at his works this year as compared with last. The size of the retorts under the new system was 21 by 15 inches; the old ones were 16-inch rounds. Last year he worked 42 retorts; this year he was working 24, and making more gas. The exact per centage he had not worked out. As to the coke, he was selling it for use in very large boilers at Kew Gardens and for the water-works, and he had never had a complaint of its quality, and he could not conceive that it would be unfit for any purpose whatever. Nor could he think that in stage floor houses the coke would be found to be damaged by dropping down into the hole beneath. A fall of 6 or 8 feet would certainly not hurt it. As to the distance required in front of the retorts for working the apparatus, he thought 22 to 26 feet would be sufficient. In his own retort-house there was a space of 24 feet in front of the retorts. As to the yield of gas, he was now making 6600 feet per mouthpiece. The question had been asked, how many men were required to work the apparatus. If the retorts in use were single retorts, three men could work the apparatus very well; two, even, could do it; but with three, one man would use the rake whilst the others attended to the charging. As to four-hour charges, he was quite aware they could be adopted under the old system, but very few managers did so, and he doubted whether any stokers could be found who would put the charges so smoothly and evenly into the retorts as this apparatus did; therefore, under the old system with four-hour charges, it would be almost impossible to obtain results equal to those obtained under West's system. One speaker remarked that 6000 feet of gas per mouthpiece was not at all an unusual thing. He (Mr. Eldridge) confessed that he had never heard much about 6000 feet until very lately, and speaking to an eminent engineer recently on the subject, he was told that even 5000 feet per mouthpiece might be considered very good, except with large retorts, when that might be considered the rule. The inquiry had been made whether the carriages ever got jammed in the retorts. No doubt, if much scurf was allowed to accumulate in the retorts they would, but in his own experience he had never had the slightest difficulty in this respect. A member had asked whether nuts were used, or large coal broken up. He (Mr. Eldridge) had frequently tried nuts, but, as a rule, did not find them so good as the other. Best Silkstone, mixed with two-thirds New Pelton, were the coals with which he made 11,000 cubic feet of gas per ton. Next winter he expected to do the whole of his work under this system.

Mr. C. Sellers (York) asked if Mr. Eldridge could give the meeting the net financial results—in per centage—of the one system and the other.

Mr. Eldridge said he could only repeat what he said before, that whereas last year he was using 42 retorts, this year he was using only 24, and yet obtained more gas.

The President said the reading of this paper had elicited some interesting testimonies, and he had no doubt that these testimonies would bear very important fruit in a short time in practical every-day experience. He had been specially interested in hearing Mr. Eldridge's remarks, because Richmond was one of his pet towns. He designed and erected the first gas-works at Richmond 30 years ago, and those works started with eight retorts. Now, as Mr. Eldridge had informed them, they had been working 42. With regard to the space required in front of the retorts, under West's system there was really no more required than was usually allowed in a retort house worked in the ordinary way. He had been in the habit

of building retort-houses 60 feet in width between the walls. The stack occupied 20 feet in the centre, leaving 20 feet of space on each side.

Mr. ELDRIDGE said he had 24 feet in front of the retorts.

The PRESIDENT remarked that he had recently designed a retort-house and gas-works complete, and had so far exceeded his own rule in this respect as to give 65 feet in width between the walls. Mr. Woodall had inquired about the character of the coke produced by West's system, and he (the President) had intended to reply thereto, but Mr. Newbigging had anticipated him. A light body did not, of course, fall so heavily as a weighty one, and this coke, being lighter, the breakage was not so great, so that no harm was likely to arise in working the system in a stage-floor house. Practically the question was answered thus—that out of every ton of coal carbonized, 33 bushels of coke had been sold. Now, he apprehended that, let the charges be what they might, nobody could match that—33 bushels, as against 23 or 24 on the old system. Mr. Goddard mentioned that the coke at Ipswich was used, a great proportion of it, for malting. At Maidstone it had been tried extensively in the hop-kilns, where coke containing much sulphur could not possibly be employed. As to the observations made upon German works, he did not think the members could satisfactorily make a comparison unless they had before them all the items which went to make up the cost of operations abroad. It might be that the great yield per mouthpiece obtained there was obtained at the sacrifice of that which, at home, they would rather not sacrifice. He believed the gas engineers in England need not fear to institute a comparison between their operations and those in any other part of the world. Then it came to this: If these things could be done, and nobody disputed it, they could work off their retorts in four hours, as against six hours on the old system, and with most advantageous results. If they worked four-hour charges on the old system, the lives of the retorts would not be so long, and the lives of the men who had to work them would be shortened. As a matter of fact, four-hour charges under the old system were not the rule. With regard to Mr. Paterson's inquiry, whether or not the advantages described were entirely attributable to the use of West's system, he (the President) might remark that he had examined it thoroughly, and, as he might acknowledge, as an interested party, having consented to act as engineer to the company. Notwithstanding that, however, he stood there to affirm, uninfluenced by any private considerations, that he had come to the conclusion, feeling there was no escape from the fact, that these results were due to the system as a whole. He would endeavour to make this clear in a statement which he would prepare and send round to each member of the Association. He did the same thing a year and a half ago in reference to the Maidstone works, and accompanied his remarks with figures showing the cost of the two systems over a period of nine months. He believed West's system would be found very valuable indeed, and he should be loth to say so of any system of which he was not fully convinced it would ultimately be a credit to him. With regard to the sulphur question, in his opening address on the previous day he made a statement which he would repeat as appropriate in this connexion:—

> I need not trouble you with any remarks or reasons to show how, and why, the use of clay retorts involves the necessity of what may be called the high-heat system, because, as practical men, you can hardly fail to know that the two—that is, clay retorts and high heats—are inseparable; but I may take this opportunity of putting forward a theory which, I believe, will be proved to be perfectly sound and reliable; hence I give it as my well-considered opinion that our common practice of charging clay retorts on the scoop system is the source and main cause of all the difficulty involved in the "sulphur compound" agitation.
>
> The coal being laid in a thick mass, the outside is overcooked before the interior has been sufficiently acted on by the heat of the oven, and this is productive of mischief, not known in the days of iron retorts, by the expulsion of the obnoxious compounds which formerly were left in the coke; hence I state it, as my belief, that the way to overcome the difficulty of not being able, by any known purifying process, to take them out of the gas, is by not, in the first instance, putting them in. And I have been led to this conclusion, by observing that this is done, in common practice, by West's system of charging, the coal being deposited in a thin stratum, and worked off in four hours instead of six, the heats and the quantity being the same as, on the scoop system, would require six hours.

Now, whatever the proportion of sulphur might be at Richmond or elsewhere—and he had no doubt about the accuracy of Mr. Eldridge's remarks—he believed it would be found that they were 40 per cent. less than they would have been under the old system. If they were 25 grains per 100 cubic feet under the old system, they would not amount to more than 15 under the new, which must be a great gain and advantage to any company.

Mr. W. J. WARNER (South Shields) read the following paper on

PERIODICAL DISTRICT PRESSURE TAKING.

In the development of the manufacture and the distribution of gas, the latter, during the last few years, appears to have made the greatest progress. While in carbonizing, condensation, and purifying there has been little improvement, governors, main and service laying, meters, and public lighting have, in some respects at least, nearly approached perfection. The results of such improvements, too, are manifest—a more satisfactory supply, and unaccounted-for gas considerably diminished. Though thus the distribution is improved, there is still another matter that demands our attention in connexion with it—I should say upon which an assured satisfactory distribution is entirely dependent—a knowledge of the service or distributory pressures of each of the districts into which a town may be divided.

The pressure is the pulse of the system, therefore there can be no true regulation of the system without an intimate acquaintance with the pulse. The economy arising from the improved condition of the distributory plant is considerable, but a more intimate knowledge of this pulse-beating would result in a greater economy in some instances, and an improved consumption in others. It is remarkable that this matter has received so little attention, as almost in every gas-works the initial pressures are well regulated and governed by delicate apparatus, and the pressure faithfully and continuously recorded and registered; but those initial pressures should be determined by a chart of the service pressures through the whole period of lighting. The necessity for this will be obvious upon a moment's reflection of the varying conditions of lighting through the year. Thus, in a district with large works and factories, and mains of scarcely sufficient calibre, an alteration of pressure should be at once made upon the closing of the factories at five or six o'clock, so in a large commercial town, on the closing of the shops in many cases, a change of pressure may be made with advantage; but such changes can only be made through a familiarity with the pressures distributed over the whole of the districts.

I think I may venture to use the name of Mr. Foulis in connexion with this subject. I believe he is so thoroughly impressed with the importance of attending to the pressures beyond the works, that he contemplates a thorough organization of this work, employing men specially for it; and the beautifully compact governor which I have the privilege of placing before you was designed for the better regulation of district pressures.

Again, consider the changes that take place in every district from extensions, opening and closing of new works, &c., and the importance of the subject will be apparent. But, beyond these disturbing causes and the change of seasons, there are those arising from stoppages by naphthaline, sinking of mains, and neglected or forgotten syphons, which can be detected only by the pressures being taken thoroughly and systematically over the whole of each district; and such is necessary to forestall complaints, to determine initial pressures, and to adjust district governors.

This subject appears, however, to have escaped writers on gas matters; and it has not, I believe, received any attention from this Association. I know of but one reference to it—it is in the JOURNAL OF GAS LIGHTING, 1852—and that notice came through a communication from myself to the late Mr. Barlow. In 1851 I had to report to the directors of the gas company, in the neighbouring city of Bath, upon the subject of distribution, and said in my report, "To complete the whole arrangement, and to extend, as it were, the system into futurity, quarterly reports of pressures in various localities are provided for, and, if made, will give timely notice of attention being required to be given to the mains." This and other matters in connexion with my arrangements for systematizing the work of distribution, I communicated to Mr. Barlow in the course of 1852, and in December there was published in the "Circular to Gas Companies" a paragraph as follows:—"We have so often experienced the want of proper records of pressures taken at different points over a whole district, during the maximum consumption of gas, in places where we have been called upon professionally to advise as to proposed enlargement of the mains, that we would suggest to managers of gas-works the advisability of making observations of the pressure in the mains in various parts of their districts between the hours of 5 and 7 p.m. for several evenings during the rest of this month; such records will be invaluable for reference in future periods."

It will be observed that this is a much lower standard than the one I had arranged to be worked to. Mine was a periodical taking, which is not alluded to in the paragraph. The minimum pressures, too, are as important to the company as the maximum is to the consumer; both alike should be taken, and taken periodically. The minimum pressure, I should say, is now becoming of more consequence to companies than the maximum. The latter may, in a measure, look after itself, but as the Referees in London will now look after the former, and as the results of these testings will be attended with penalties, this subject must now be dealt with as the testing for illuminating power—by careful periodical testing. "According to the provisions" (as per letter to the JOURNAL by Mr. A. Vernon Harcourt, April 17, 1877) "of The Gaslight and Coke Company's Act, 1876 (sections 27, 42, and 52), and the identical provisions of the South Metropolitan Gaslight and Coke Company's Act, 1876, the Gas Referees are to prescribe the mode to be adopted for testing the pressure of gas supplied by the company, and the number of the times of testing; the average of all the testings of pressure prescribed under this Act from midnight to sunset, and the average of all the testings of pressure from sunset to midnight shall be deemed to represent the pressures during each of these periods;" and "if on any day, whether during the period from midnight to sunset, or during the period from sunset to midnight, the gas supplied by the company from any station is supplied at a pressure less than it ought to be under this Act, the company shall forfeit a sum not exceeding ten pounds for each station, in respect of which they are so in default." The minutes of evidence on the Metropolis Gas Companies Bill, 1875, shadow forth the adoption of a system of taking pressures at all times over the whole of the ramifications of the gas companies mains. Thus, question 7312 is: "Can it be necessary day by day, in the absence of any complaint, to do it?" To which Mr. Keates answered: "I can give a very good reason for that; I think the pressure ought to be taken." Again, Dr. William Pole, at 7329 says: "If it is desirable that some check should be put upon the company as regards the pressure, the only feasible plan seems to be that the pressure should be tried from time to time, at different places, by some inspector appointed for the purpose on behalf of the public." Again (7338), the same witness (and he is a gentleman, I need not add, of no mean authority in gas matters) says: "I believe the pressure should be tested not at any fixed station, but at several points in the district."

Thus far for the principle; but the difficulty appears to have arisen in the carrying of it out. Mr. Keates says (7311): "I do not say that there is any difficulty in an engineer going and putting a pressure-gauge upon a main, but as a working thing, from day to day, it is impossible." So at 7329 Dr. Pole, in a memorandum which he read, says: "The Referees could only prescribe that the pressure should be tested at certain hours at some fixed station. But this would give no assurance that the pressure should be, as stipulated in clause 8, 6-10ths or 10-10ths 'at the main near the junction therewith of every customer's service-pipe.' I doubt whether there is any feasible mode of testing systematically the fulfilment of the conditions of clause 8."

From our own practical experience we cannot but endorse the evidence of these gentlemen. For our own purposes we should have the power of taking the pressures over a whole district, that such pressures should be taken at the mains, but there has not hitherto been "any feasible mode of testing systematically."

Taking pressures either from the inside of houses or from the public lamps is most unsatisfactory, as all know who have attempted it; indeed, most troublesome and vexatious in winter weather, as well as unreliable at all times; besides which, if the district is at all extensive, it is impossible to get through it in one night during the hours of maximum consumption.

To take district pressures, then, it is necessary there should be a ready means of communication with the mains themselves, that the pressures taken should be reliable, that the apparatus should be strong and simple, that it should effectually prevent any loss of gas, there should be no possibility of danger from covers being left open in roads, and the price should be a moderate one. How far my patent stand-pipe valve, which is now before you, and was described in the paper I had the honour of reading to the Association last year, answers to these requirements I must leave you to determine; suffice it to say that a large and short gas-way only is required from the main to the cock, which is considerable—made proportionate to a three-quarter cock for iron tubing. The junction of the pipe of the pressure-gauge is simple and effectual, and cannot get out of order, being a bayonet joint and an india-rubber washer. The gas must be turned off before the pressure-gauge tube or stand-pipe can be withdrawn. The arrangement of covers precludes dirt and water and liability to damage by being left open, the outer one closing by its own gravity. There is no special arrangement of the pressure-gauge necessary for this work. I prefer the ordinary one enclosed in a tin case, with cocks to close connexion with air and gas, so that the water may not be disturbed in carrying.

The positions for taking the pressures, as I have them arranged, are along the trunk and leading mains a short distance before and after the junctions with the branch mains; at those positions where the mains are diminished, at the foot, top, and up the sides of hills; along the principal streets; and at the extreme ends of the districts.

The forms for entering these pressures into, as taken, I have placed before you, a sheet being given to the inspector for each taking, from which the work is to be copied into a book. Each stand-pipe valve being numbered, the pressures can be compared with each other and the initial pressures, which can only thus be regulated for the maximum and minimum for each of the four seasons of the year.

My subject is not so attractive as I could wish, but I think it must be a

suggestive one, as I know of very large districts where this work is never done; and I feel assured there is an earnest desire amongst the members of this Association—which the Association has encouraged, if not engendered—to supply, as efficiently and economically as possible, the several districts committed to their care, without regard to their position, importance, or magnitude.

District Pressures (Maximum), Month of January.

Street or Place.	Stand-Pipe Valve No.	1865. Jan. 8.		1866. Jan. 11.		1867. Jan. 5.		—		—	
		Time.	10ths. of an Inch.	Time.	10ths. of an Inch.	Time.	10ths. of an Inch.	Time.	10ths. of an Inch.	Time.	10ths. of an Inch.
Initial Pressure .	..	..	20	..	20	..	20				
Albion Street . .	1	p.m 5.0	18	p.m 5.5	19	p.m 5.0	17				
Hurworth Place . .	2	5.10	17	5.12	16	5 8	16				
Curson Street . .	3	5.15	17	5.16	16	5.11	15				
Queen's Square . .	4	5 25	16	5.25	15	5.20	14				
Market Street . .	5	5.30	14	5.30	15	5.25	12				
—	6	—									
—	7	—									
—	8	—									
—	9	—									
—	10	6.0									
—	11	—									
—	12	—									
—	13	—									
—	14	—									
—	15	—									
—	16	—									
—	17	—									
—	18	—									
—	19	—									
—	20	7.0									

The same form is used for minimum pressures.

The PRESIDENT said Mr. Warner had dealt in his paper with a most important subject. He had been personally acquainted with many companies in which half a dividend had been wasted for want of such simple means as Mr. Warner had indicated. These were matters which could not have too much attention. The waste which constantly occurred for want of a due regulation of pressure at different parts of a district was most serious. In some places there would be perhaps three or four times as much as was wanted, whilst in others there would be a deficiency, the constant source of complaint and annoyance. Mr. Warner deserved thanks for bringing the question before the Association.

Mr. A. LASS (London) read the following paper:—

IS THE ADOPTION OF THE FORM OF ACCOUNTS AS SCHEDULED IN THE GAS-WORKS CLAUSES ACT, 1871, BY ALL GAS COMPANIES OR CORPORATIONS DESIRABLE?

Before I proceed with the consideration of the subject under review, it will be necessary to take a glance at a few of the more prominent events in the history of gas legislation, which led up to the adoption of the form of accounts as scheduled in the Gas-Works Clauses Act, 1871, and for this purpose I propose commencing with the year 1847, for it was during the session of that year that the first general or model Act was passed, entitled "An Act for Consolidating in one Act certain Provisions usually contained in Acts authorizing the Making of Gas-Works for Supplying Towns with Gas," usually called the "Gas-Works Clauses Act, 1847."

On reference to the various clauses incorporated therein, it will be seen that after limiting the dividends to 10 per cent., making provision for the application of the surplus profits and the creation of a reserve-fund, it was by section 35 enacted "That in England or Ireland the Court of Quarter Sessions, and in Scotland the Sheriff, may, on the petition of any two gas ratepayers, within the limits of the special Act, nominate and appoint some accountant or other competent person, not being a proprietor of any gas-works, to examine and ascertain, at the expense of the undertakers (the amount of such expense to be determined by the said court or sheriff), the actual state and condition of the concerns of the undertakers, and to make report thereof to the said court at the then present or some following sessions, or to the sheriff; and the said court or sheriff may examine any witnesses upon oath touching the truth of the said accounts and the matters therein referred to, and if it thereupon appear to the said court or sheriff that the profits of the undertakers for the preceding year have exceeded the prescribed rate, the undertakers shall, in case the whole of the said reserve-fund has been and then remains invested as aforesaid, and in case dividends to the amount hereinbefore limited have been paid, make such a rateable reduction in the rate for gas to be furnished by them, as in the judgment of the said court or sheriff shall be proper, but so as such rates, when reduced, shall ensure to the undertakers (regard being had to the amount of profit before received) a profit as near as may be to the prescribed rate."

And with respect to the yearly receipts and expenditure of the undertakers, it was by section 38 enacted "That the undertakers shall in each year, after they have begun to supply gas under the provisions of this or the special Act, cause an account, in abstract, to be prepared of the total receipts and expenditure of all rents or funds levied under the powers of this or the special Act for the year preceding, under the several distinct heads of receipts and expenditure, with a statement of the balance of such account, duly audited and certified by the chairman of the undertakers, and also by the auditors thereof, if any. And a copy of such annual account, if the gas-works be situated in England or Ireland, shall be transmitted, free of charge, to the clerk of the peace for the county in which the gas-works are situate. And if the gas-works be situated in Scotland, such copy shall be transmitted, free of charge as aforesaid, to the sheriff-clerk of such county, and such transmission shall be made on or before the 31st day of January in each year, under a penalty of £20 for each default, and the copy of such account so sent to the said clerk of the peace, or sheriff-clerk, shall be kept by him, and shall be open to inspection by all persons, at all reasonable hours, on payment of one shilling for each inspection."

It now, therefore, became necessary for all companies who should hereafter apply to Parliament, and should have incorporated with their special Act the Gas-Works Clauses Act, 1847, to keep their accounts in accordance with the provisions thereof; but as the Gas-Works Clauses Act, 1847, extended only "to such gas-works as shall be authorized by any Act of Parliament, hereafter to be passed, which shall declare that this Act shall be incorporated therewith," it did not affect the London companies. I believe, however, they allowed their operations to be guided by those clauses in the Act which regulated the dividends, the formation of a reserve-fund, and the price of gas to the public; but in the face of the active spirit of competition which at that time prevailed, it was somewhat difficult for them to maintain the 10 per cent. dividend. "Competition may be the very life and soul of commercial enterprise, and monopolies may be distasteful to the general public and the world at large;" but competition, so far as the London companies were concerned, involved waste of capital and loss of profit, and, so far as the public were concerned, both loss and inconvenience, besides preventing a permanent reduction in the price of gas. It therefore became evident that the principles of competition, notwithstanding the tendency of legislation to foster the same, were neither advantageous to the companies nor beneficial to the public; and subsequent experience has fully demonstrated the fact that, "with regard to the supply of gas or water, a monopoly regulated by statute is the most economical mode of giving such supply."

Competition existed down to as late a period as 1857; for at that time parts of the Metropolis were being supplied by two or three companies. The following are a few of the principal events which occurred during the "transition period"—from "competition" to "monopoly regulated by statute"—which will, of course, embrace the "districting arrangements."

In the year 1850 the Chartered, the London, and the Equitable Companies endeavoured to effect a districting arrangement, but their application to Parliament was not successful. In the year 1851 the Phœnix, the London, the South Metropolitan, and the Surrey Consumers effected a districting arrangement without the sanction of Parliament, and in the year 1855 they applied to Parliament to sanction the arrangement, but their application was not successful.

In the year 1857 the companies on the north side of the Thames entered into negotiations for districting the rest of the Metropolis; but no sooner was this announced than the local authorities commenced taking active steps for procuring legislative enactments for the protection of the public against this threatened monopoly, which resulted in the matter being brought under the consideration of Parliament, and after several long inquiries before select committees, an Act, during the session of 1860, was passed, entitled, "An Act for better Regulating the Supply of Gas to the Metropolis," which Act recited as follows, viz.:—

"Whereas the following gas companies—The Gaslight and Coke Company, the City of London Gaslight and Coke Company, the Commercial Gaslight and Coke Company, the Equitable Gaslight Company, the Great Central Gas Consumers Company, the Independent Gaslight and Coke Company, the London Gaslight Company, the Phœnix Gaslight and Coke Company, the Ratcliff Gaslight and Coke Company, the Surrey Consumers Gas Company, the South Metropolitan Gaslight and Coke Company, the Western Gaslight Company, Limited, and the Imperial Gaslight and Coke Company—or some or one of them, are respectively incorporated under the authority of Parliament for the purpose of supplying several districts of the Metropolis with gas, and the several companies, instead of supplying gas by several mains in the same district, have agreed as far as possible each one to confine its supply to a separate district, in order to economize capital and avoid the too frequent opening of the public streets, and subject to the provisions and restrictions of this Act it is expedient that such districting should receive the sanction of Parliament."

The Gas-Works Clauses Act, 1847, being incorporated with the Metropolis Gas Act, 1860, all the London companies who were not at that time subject to its provisions were now made subject thereto. The limitation of dividends, under the Act of 1847, to 10 per cent., was not disturbed by the Act of 1860, but the benefits arising from the reserve-fund clauses were considerably curtailed, besides imposing additional restrictions as to price, illuminating power, purity, pressures, &c., upon which it is not within the scope of this paper to dwell.

The clauses, however, in the Act of 1847 which rendered it necessary to furnish annual statements of account to the clerk of the peace were (so far as the Metropolitan Companies were concerned) repealed by section 41 of the Metropolis Gas Act, 1860, which section is as follows, viz.:—

"The said Secretary of State may at any time issue a form of accounts to be filled up by each of the said gas companies, and such accounts shall state precisely the amounts of the capital of each company, and the Acts of Parliament or other authority under which the same is raised, and such other information as the said secretary may require in order to enable him to ascertain the actual state and condition of the concerns of such company; and every gas company shall after receiving notice in writing, signed by the said secretary, of the form so required by him to be filled up, within two months after the general meeting of the company fill up and forward to the said secretary an annual statement of accounts in the form so prescribed, and any company which shall fail to furnish such account shall be liable, on conviction before a magistrate, to forfeit any sum not exceeding £50, and such statement shall be laid by the Secretary of State before both Houses of Parliament every year."

It will now be seen that for the first time the metropolitan companies were bound to furnish annual statements of account according to a specified form.

Legislation remained in this condition (although agitation continued) until the year 1868, when an Act was passed called "The City of London Gas Act," in which were incorporated clauses relating to the purchase of gas undertakings, amalgamation, dividends, application of profits, appointment of Referees, illuminating power and price, tests for illuminating power and purity, together with the famous revision clauses; and an attentive perusal of this Act will well repay any person connected with gas undertakings, but the following clauses in that Act relating to the accounts are those to which I wish now more particularly to refer, viz.:—

"There shall be an auditor of the accounts of the companies, being a competent and impartial person, from time to time appointed by, and removable by, the Board of Trade."

"The auditor shall with all practicable speed after the passing of this Act investigate the accounts of the companies, and ascertain and certify the amounts of their capitals, distinguishing share from loan capital."

"The auditor shall from time to time prescribe a uniform form of accounts to be kept by the companies."

"The auditor shall half yearly audit the accounts of the companies, and if he finds the same correct, he shall certify the same respectively, but if in any instance he finds the accounts incorrect in principle or detail, he shall require the company to correct the same in such manner as he thinks right, and a dividend shall not in any case be declared until the accounts are certified by the auditor, and the accounts; as certified, shall be laid before both Houses of Parliament."

"Each company shall give to the auditor, his clerks, and assistants, access to the books and documents of the company, and shall, when required, furnish to him and them all vouchers and information requisite for the purposes of the audit, and shall afford to him and them all facilities for the proper execution of his and their duty."

I am perfectly aware that the Metropolis Gas Act, 1860, and the City of London Gas Act, 1868, affected only the Metropolitan companies, but as all questions of an important character, whether social, moral, religious, political, or commercial, which agitate the public mind in the Metropolis, tend, to a certain extent, to mould and shape the opinions of the country at large—the Metropolis being like a mighty heart sending forth its pulsations, and giving life and vigour to everything brought within its influence—so with the great question of gas supply; for, in the year 1871, an Act was passed for "amending the Gas-Works Clauses Act, 1847," and a perusal of the clauses which are incorporated therein, with respect to the accounts of gas companies, and especially Schedule B, referred to in the said Act,

will clearly prove that legislation upon gas matters since 1847, although only relating to the Metropolitan companies, had not only moulded and influenced the legislative enactments for that year, but would thereafter affect the country at large; for by section 3 of the Gas-Works Clauses Act, 1871, it is enacted that "the provisions of this Act shall apply to every undertaking authorized by special Act hereafter passed, or by any provisional Order made under the authority of the Gas and Water Works Facilities Act, 1870, save where such provisions are expressly varied or excepted by any such special Act or Provisional Order."

The sections in the Gas-Works Clauses (Amendment) Act, 1871, which now require our attention are the following, viz.:—

"The undertakers shall fill up and forward to the local authority of every district, within the limits of the special Act, on or before the 25th day of March in each year, an annual statement of account, made up to the 31st day of December then next preceding, as near as may be in the form, and containing the particulars specified in Schedule B to this Act annexed."

"The undertakers shall keep copies of such annual statements at their offices, and sell the same to any applicant, at a price not exceeding one shilling for each such copy."

"The Board of Trade, with the consent of the undertakers, may alter the said forms for the purpose of adapting them to the circumstances of the undertaking, or of better carrying into effect the objects of this section."

"In case the undertakers make default in complying with the provisions of this section, they shall be liable to a penalty not exceeding 40s. for each day during which default continues."*

Having traced what I consider to be the history of the form of accounts, as scheduled in the Act of 1871, it now remains to be proved whether such form, whose history is so interesting, is one which in itself will meet the requirements of gas companies, and also whether, from an accountant's point of view, it meets generally those requirements which are considered necessary and essential.

Book-keeping has been beautifully described, by an eminent author, as "a branch of science which teaches us to record mercantile transactions in a regular and systematic manner;" and the same author states that a "merchant's books should exhibit the true state of his affairs; they ought to show the particular success of each transaction, as well as the general result of the whole, and should be so arranged as to afford correct and ready information on every subject for which they may be consulted." Some years ago the science of book-keeping was but imperfectly understood and little appreciated, but of late years the development of trade and commerce, and the formation of joint-stock and other companies, have tended greatly to increase its study, and enlarge the circle of those whose business it is to record, in a clear and concise manner, the numerous and complicated transactions in connexion with the commercial pursuits of this vast and mighty empire; but looking only at the extent of the commercial relationship existing between the metropolitan gas companies and the metropolitan gas consumers—viz., a capital employed of upwards of £11,000,000, from which a yearly revenue is derived of upwards of £3,360,000—it is not a matter of surprise that the science of book-keeping should have been evoked to aid the spirits in elaborating and perfecting a system of accounts specially adapted to meet their peculiar requirements.

During the progress of the Gas-Works Clauses (Amendment) Bill through Parliament some opposition was given to those clauses which related to the form of accounts, and, on reference to the JOURNAL of the 23rd of May, 1871, it will be seen that their opinion respecting this matter is not a favourable one, for they say, "On the question of accounts we are sorry to say that the Board of Trade were inexorable, and we fear that it will be enacted that every little company who may hereafter apply for a Provisional Order will be compelled to keep and publish accounts in the same forms as are prescribed for the large metropolitan companies. The hardship of this to small companies, and the fact that by adding as it will to the expenses of every company, must tend to defeat the professedly chief objects of the Bill." And in order to prove that the difficulty of making up the accounts had not been exaggerated, they referred to the nine forms in which the accounts must be produced, and then proceeded to state that "the preparation of the several accounts from the books of the companies, as they are ordinarily kept, will necessitate the employment of skilled accountants to dissect and arrange the items."

There may possibly be difficulties in the way of small companies dissecting and arranging the charges under the various prescribed heads, and there may possibly be difficulties arising from the fact that the manager, although thoroughly skilled in the science of gas manufacture and distribution, may not be an accountant, or that he may be so fully occupied as to leave but little, if any, time for account-keeping; but these, in my opinion, do not constitute valid objections to the adoption of a form which exhibits the true state and condition of the company, and shows the correct results of the trading operations. And as to the question of expense, that should not be named, for what is worth doing at all is worth doing well; there being many at the present time who have been compelled to seek the protection of the Bankruptcy Laws who need not have done so had their accounts been well arranged and accurately kept. The true province of an accountant is not so much to "wind up" as it is to "mend and heal;" and, as the storm signal tells of dangers to come, and thus indirectly keeps many a mariner from a watery grave, and many a stately ship from sinking, so accounts well kept should act as a beacon light, guiding the commercially tossed and weather-beaten into a haven of repose and safety; but not only so, one clear effect of the provisions of the Gas-Works Clauses Act, 1871, as stated in the JOURNAL OF GAS LIGHTING of the 23rd of May, 1871, will be "to put an end to the loose system in which some companies keep their accounts, and by rendering them accessible to the public, preclude that system of concealment which has proved so prejudicial to the interests of gas companies." In my opinion, however, the object of the Legislature, in introducing a form of accounts was not so much to put an end to the loose system in which some companies kept their accounts, as to introduce "uniformity," and thus provide a remedy for the difficulty which surrounded all parliamentary inquiries in obtaining that special information as to the practical working of the undertaking as would enable comparisons to be made with the London or other companies.

The following, therefore, is the first question which arises—viz., Does the form of account, as set out in Schedule B, meet the requirements of gas companies?

I am of opinion that it does, because the form clearly defines the position of the share and loan capital, the fixed plant accounts, the profit which has been earned, and shows, under proper and convenient heads, the amount expended in each department to earn that profit, the application thereof, together with the actual position of the company.

Further, I am of opinion that if the form, as set out in Schedule B, can be made the basis upon which an analytical working statement, similar to the following, can be constructed, it may be considered one which is peculiarly adapted to meet the requirements of gas companies.

* Schedule B to the above Act contains the form of account. It was published *in extenso* in the JOURNAL, vol. xx., p. 543.

As an example, I have selected the working statement which I prepared on behalf of the Blackburn Gaslight Company.*

Further, I am of opinion that the prescribed form of accounts meets the requirements of gas companies, because, after the preparation of a working statement similar to the above, the results of the working can be easily compared, not only with those of previous years, but with the working of the metropolitan and other gas companies, and the benefit arising therefrom to a manager who is desirous of becoming thoroughly efficient in his profession, is incalculable, as it not only reveals to him the weak points, but enables him to guard against and rectify them in the future.

And, lastly, I am of opinion that the prescribed form of accounts meets the requirements of gas companies, because, after a series of years, the working statements become very valuable data, not only for evidence, should it be necessary at any time to apply to Parliament for statutory powers, additional capital, or a maximum price, but also for the computation of the commercial value of the undertaking, should the local authorities at any time deem it advisable, in the interests of the ratepayers, to buy up the same.

The second question which arises is, Whether the form of account, as set out in Schedule B, is one which it is desirable for all gas companies to adopt? I am of opinion that it is.

1. As to those companies who have obtained parliamentary powers, and have incorporated with their special Act the Gas-Works Clauses Act, 1871.

There can be no question as to the desirability of those companies adopting the form, because all companies who have parliamentary obligations imposed upon them should strictly and honestly carry them out.

2. As to those companies who have obtained parliamentry powers and have incorporated with their special Act the Gas-Works Clauses Act, 1847.

There is, I believe, an opinion prevailing that no companies are bound by the provisions of the Gas-Works Clauses Act, 1871, except those who have obtained parliamentary powers subsequently to the passing of that Act, and, supposing that opinion be correct, I consider it would be very desirable even for those companies to be regulated by the provisions of the 1871 Act; but over and above all this, there is a very grave question whether those companies who have incorporated with their special Act the Gas-Works Clauses Act, 1847, are not bound by the Gas-Works Clauses (Amendment) Act, 1871.

The action upon which the whole matter hinges came on upon appeal in the Court of Queen's Bench, on the 8th of June, 1875, and is reported in the *Weekly Reporter* of the 28th of August, 1875, vol. xxiii., p. 874-5:—

"*Commercial Gas Company, Appellants, v. Scott, Respondent.*

"The appellants Act was passed in 1852, and incorporated the Gas-Works Clauses Act, 1847. By the Metropolis Gas Act, 1860, that statute specifically applies to the appellant company, and enacts that their gas-works are to be considered as authorized by the Act of 1847. By the Gas-Works Clauses Act, 1871, section 1, 'The Gas-Works Clauses Act, 1847, and this Act shall be construed together, and the provisions of this Act shall be held to repeal and supersede such of the provisions of that Act as are inconsistent with this Act.'

"The appellants having been convicted under section 36 of the Act of 1871,

"The Court held that the magistrate was right in considering that the appellant company was operated upon by the Act of 1871, and that the appellants were rightly convicted.

"Mr. Justice Lush said: I am of opinion that this conviction was right. The Gas-Works Clauses Act, 1847, was a model Act to be applied to any gas-works authorized by any Act of Parliament thereafter to be passed, and incorporating the Act of 1847 with it. The special Act of the appellant company was passed in 1852, and did incorporate the Act of 1847. So things remained until 1860, when the Metropolis Gas Act of that year expressly provided that this company and others should be considered as authorized by, and should be regulated by the Act of 1847. Then came the Act of 1871, which was also a model Act, and by section 1 it is to take the place, as it were, of the Act of 1847. It operates, therefore, upon all the metropolitan companies which by the Act of 1860 were brought under the Act of 1847. It was contended that the object of section 3 was to limit the operation of the Act to companies formed after the passing of the Act. But it seems to me that the object of that section is to apply the statute to all gas companies formed in the future, whether their special Acts incorporate the Act of 1871 or not. The Act of 1871 is a general Act, and it was not necessary, as in the Metropolis Gas Act, 1860, to apply the statute to the different companies by name.

"Mr. Justice Quain said: I am of the same opinion. The general Act of 1871 concerning gas must be held to apply to this company and all others that up to that time had been under the operation of the Act of 1847."

Whatever our own private views upon this important case may be, it must be borne in mind that as the decision of the judges has never been appealed against, it stands as law.

3. As to those companies who have not obtained parliamentary powers.

I am of opinion that everything which has been advanced with reference to the desirability of the adoption of the form of accounts by statutory companies applies with equal force to all others. No companies should work in the dark, and all should bear in mind the liability to attack from without. It is therefore exceedingly incumbent upon them to fortify their position by voluntarily placing themselves under the provisions of the Gas-Works Clauses Act, 1871. The benefit, however, which would arise from this voluntary action would only be partial, as the commercial value of their undertakings would not be worth more than 16⅔ years purchase, whereas if they placed themselves under parliamentary control, notwithstanding the restrictions which would be imposed as to price, illuminating power, purity, or auction clauses, that value would be increased from 16⅔ years to 22 or 23 years purchase.

Therefore, looking at the matter as a whole, I am of opinion that the adoption of the form of accounts as scheduled in the Gas-Works Clauses Act, 1871, by all companies is desirable.

It now remains for me to take up the second part of this subject—viz., Is the adoption of the form of accounts as scheduled in the Gas-Works Clauses Act, 1871, by corporations desirable.

As this is an exceedingly important subject, and one which at the present time is creating a vast amount of attention, perhaps it would not be altogether out of place if, before going into the question as to the desirability of the adoption of the form of accounts by corporations, we inquired:

1. What gave rise to the system of transfer?

2. Is it desirable that gas undertakings should be under the control of local authorities?

The chief cause of the introduction of the system of transfer to local authorities is, I believe, to be found in the prosperous condition to which, after years of labour and struggle, the companies have attained. And as to the desirability of gas undertakings being under the control of local authorities, one thing is quite certain, that we are brought face to face with the fact that the present tendency of current events and public opinion is in favour of such transfer. Under these circumstances, it is

* This statement was published in the JOURNAL, vol. xxix., p. 554.

for us to inquire whether or not it is desirable that local authorities should be liable to the same restrictions, and be bound by the same laws, as those which regulated the undertakings when they were in the hands of the companies? And with regard to this, there can be but one opinion—viz., that it is desirable, and the reason why is to be found in the fact that local bodies are only custodians of the public purse. And if it be desirable for local bodies, having gas undertakings, to be governed by the same laws as those which regulate gas companies, it is of course desirable that they should adopt the same form of accounts. For is it not desirable that gas consumers should know, not only the amount of profit which has been earned, but, what more particularly affects them, how that profit has been applied?

The question as to the proper application of gas profits, supposing profits have been made, or the making up of deficiencies, supposing losses have occurred, are exceedingly important, both for gas consumers and ratepayers.

Supposing profits have been made, is it fair to gas consumers that those profits should be applied to the carrying out of general improvements, in payment of which the rates only are applicable? And supposing losses have occurred, is it fair that those losses should be made good out of the pockets of the ratepayers? In either of these cases does each, in turn, suffer unjustly?

The true economy of gas manufacture in the hands of local authorities is this—viz., to charge such a price only, per 1000 cubic feet, as will, after paying all working expenses, keeping the plant in an efficient state of repair, and paying interest on capital, provide, yearly, a sum for the extinction of the debt created for the purchase of the works; and after this debt has been extinguished, to supply gas at such a price, per 1000 cubic feet, as will provide for those expenses only which must necessarily be incurred in connexion with the manufacture and supply of gas.

Under these circumstances, it appears to me not only desirable but absolutely necessary, in the interests alike of consumers and ratepayers, that the accounts of local authorities should be kept in accordance with the form prescribed by the Gas-Works Clauses Act, 1871, in order that it may be clearly demonstrated whether or not they are conducting the business of gas manufacture with economy and efficiency.

Mr. Jones (Chesterfield) said he was not quite sure that he entirely understood the purport of the paper just read; but assuming it to be the desirability of having a uniform mode of making up accounts, he would remark that not only was it desirable so far as pounds, shillings, and pence were concerned, but, in his opinion, it should extend to the coals carbonized, and the produce per ton. He thought a great deal of nonsense was talked about the extra produce per ton realized by some managers without it being clearly understood whether corrections had been made for standard temperature and pressure. The statement was generally made from an estimate at the station-meter.

The President said he must remind Mr. Jones that his remarks were somewhat outside the question. It was not now a point for discussion what gas engineers or managers might do in reference to the temperature at which they measured their gas; it was simply a question of accounts, and how those accounts might affect the interests of manufacturers and consumers. It did not relate to the accuracy or non-accuracy of the mode of conducting the business.

Mr. H. P. Stephenson (London) said most of those present would naturally object to explain to the world at large what was going on in their insides—he meant in their minds. Therefore it was easy to imagine that a good many managers would feel a difficulty and hesitation about publishing all the details connected with their particular manufacture. But he thought Mr. Lass had very clearly pointed out that though, on the one hand, there might be disadvantages, there were large compensating advantages on the other, in the adoption of a uniform form of accounts like that scheduled in the Act of Parliament. It enabled a great number of men, who were working well in many respects, and not so well in others, to make comparisons, and find out their weak points. When instituting inquiries of this kind, it would, probably, happen that they would discover the circumstances which explained the discrepancy. Therefore, generally, he thought it was desirable that all gas companies should have a regular form of accounts, specifying the several items in detail, so as to enable managers to compare themselves with their fellows. At the same time he might remark that he did not think the form of accounts prescribed in the Act of 1871 required sufficient information to be given to enable this to be done, and perhaps the last speaker was just coming to this point when he raised the question of the production of gas per ton of coal. He (Mr. Stephenson) would rather say that in order to make the form of accounts complete there should be provision in it for giving the quantity of gas supplied to the public lamps, as distinct from the quantity of gas sold otherwise. If there was no valid objection on the part of gas managers to give that information, and this could be incorporated in the 1871 form of accounts, it would enable better comparisons to be established.

Mr. West (Maidstone) was quite of the same opinion. For 15 years he was connected with very large provincial works, and during that time he could hardly get information on the various matters of working detail such as gas per ton of coal carbonized, leakage, &c. At that time he thought that all companies went on the same principle, but on removing from that station he found himself quite in a dilemma, and could not ascertain at all what they had been doing. Gas managers were, in a sense, moveable bodies, and it was well they should have the means of readily ascertaining for themselves what was expected from them in any new engagements they might undertake, and what previous managers had been doing. There was another advantage to be obtained from having uniformity in accounts. Some present might know that at Maidstone there had been a little agitation in connexion with the supply of gas, and the local authorities said they could not understand the company's accounts; that although kept very accurately, they were not in accordance with the Act of 1871. They wanted the accounts for previous years, and his directors thought it desirable to get them out in that form. Accordingly he (Mr. West) and Mr. Lass went through the books for perhaps 20 years, and the accounts so prepared were shown to the local authorities. The result was the latter were so satisfied with the way in which the affairs of the company had been conducted, that they said, "Let them alone; they can do better for us than we can do for ourselves." He was convinced that it was prudent to let the public see what the companies were doing, and, as suggested, to give every particular in detail. The question then arose whether this was practicable—whether it would entail too much trouble. He thought not. He would like to ask Mr. Lass to state, when making his reply, whether local authorities having gas-works were required to furnish their accounts in this form. If not, he thought they should.

Mr. Eldridge (Richmond) said he had thought there could not be a question that all companies established were bound to keep their accounts in the form prescribed by the Act of 1871.

Mr. Jones said it could only apply to incorporated companies.

Mr. Ford (Stockton), referring to some remarks at the close of the paper, said he considered that it was not fair to say that the ratepayers should not receive the profits, but only the consumers. Therefore he contended that corporations were perfectly justified in paying over a certain amount of surplus profits to the ratepayers who were not consumers.

Mr. Hunter (Salford) thought that from whatever stand-point they looked at the question—whether as members of corporations, or as proprietors of, and investors in, gas-works, or as ratepayers—they must all agree in principle with Mr. Lass, that it was desirable to adopt a uniform form of accounts. He had himself been so much interested in this particular form that he had urged its adoption upon the Gas Committee of Salford from the first. Whether it was better or worse than some other form that could be invented he was not prepared to say; but he thought that, it having been prescribed for the metropolitan companies, it might be looked upon as a good one to be adopted in the provinces. Years ago he certainly thought that he had a better form of his own, but that he cared nothing for, and he ventured to say that the form scheduled in the Act of 1871 gave every kind of information that could be desired, and that was necessary to enable managers to compare their workings one with another. It appeared to him that the random statements one sometimes met with would never have been made if they all based their accounts upon some given standard. A previous speaker suggested that it would be well if the form adopted gave such particulars as the number of tons of coal carbonized, the consumption of the public lamps, &c. Now he (Mr. Hunter) had not seen the form of accounts prescribed by the Act of 1871 for some months, but if his memory served him right, it did require at least some of these particulars to be given. Looking at the question as a proprietor of gas shares, he should certainly feel more confidence in a company which gave him all these details. It always seemed to him to require a stretch of confidence in the case of those companies in which the information furnished by the directors was sparse and general. And surely if it was considered necessary that all these particulars should be given in London, there could be no injustice in requiring them in the country. As an officer of a corporation, he would add that he had never lost anything by being free in furnishing information on such points. He had heard gas and water accounts discussed in public meetings, and had always noticed that those concerns were doing best which gave the largest amount of detailed information to their proprietors.

Mr. Irons (Gosport) said, having kept accounts for some years in the form under discussion, he was prepared to affirm that it was desirable all companies and corporations should adopt it. At the same time, he expressed an opinion that it was quite within the functions of the Association, or its committee, to go into this matter and prepare some uniform system by which managers, amongst themselves, would be able to ascertain more accurately and strictly the results at which they had arrived.

Mr. Frith (Runcorn) said he was much pleased with Mr. Lass's paper. Having been connected with gas accounts for the last quarter of a century, and taken a very great interest in them, he would express an opinion that it was not only desirable such accounts should be kept on this system, but that it was necessary. In a great many works accounts, or what were called accounts, were kept, but virtually they furnished no information worth calling such. They did not give satisfaction to the manager any more than they did to the shareholders. In fact, a manager ought first to satisfy himself, and then he might hope to satisfy his shareholders, he could not do it otherwise. He (Mr. Frith) hoped that managers generally would take a greater interest in this matter in the future than they had done in the past, and feel themselves bound to satisfy themselves of the correctness of their accounts, and that it would not happen, as, from personal experience, he knew was too often the case, that the auditors, instead of finding the accounts correct, had to make them so. Managers ought to have their accounts so kept that they could put them before any auditor with the conviction that they were perfectly correct, and not accompanied with the apology, "There is a mistake somewhere which I cannot find out, but must leave you to do it." It was a common saying that "what is worth doing at all is worth doing well," and both managers and secretaries of gas companies should determine that this important portion of their work should be done thoroughly.

Mr. Lass replied. He regretted exceedingly that Mr. Jones did not hear very clearly the reading of his paper. Mr. Stephenson suggested that the 1871 form of accounts was not sufficient in two or three particulars, especially with regard to the supply of gas to the public lamps. The form, no doubt, was deficient in that respect, and if any alteration was introduced, provision should be made, not only for recording the number of cubic feet of gas so supplied (which in some cases, especially where the average meter system was not in use, could hardly be ascertained), but also to meet the case where the gas was not registered by meter, a space should be left for the number of public lamps and the hours of burning. The object of the Legislature in omitting to make provision for such a return, it was not for him to say. Mr. West asked whether the local authorities possessing gas-works were bound to keep their accounts in this way. If the Act of 1871 was incorporated in the special Acts under which corporations acquired gas-works, he presumed they would be required so to keep their accounts, and also to issue them in the prescribed form. But there was this restriction in clause 3, "Save where the said provisions are expressly varied or excepted by any such special Act or Provisional Order." As to Mr. Ford's remarks about the application of profits, he (Mr. Lass), in his paper, put it in this way: "Supposing profits have been made, is it fair to gas consumers that those profits should be applied to carrying out general improvements?" There was a grand principle underlying this which he did not profess to settle. Mr. Hunter was quite right in saying that the 1871 form did provide for recording the number of tons of coal carbonized, also for the quantity in stock at the beginning of the year, the quantity received during the year, and the quantity remaining in store at the end of the year. It also made provision for recording the quantity of gas sold for private consumption. The only point in which there seemed to be a requirement was in the quantity of gas supplied to the public lamps.

The President said he thought they ought to be much obliged to Mr. Lass for furnishing material for the interesting discussion which had taken place. It seemed that Mr. Stephenson had a great objection to being turned inside out, but, notwithstanding the delicacy of that operation, he was prepared to consent, believing that it might be for his own benefit, or for the benefit of some one else. One speaker had observed that non-statutory companies were not affected by this provision for keeping accounts. That was true, but beside that class of companies there were others—viz., those incorporated before the Act of 1871 was passed, who clung to the opinion that they were not bound to comply with its provisions. He believed, however, that this was a delusion, and that, if called upon by the local authorities, they would be bound to render accounts in the prescribed form. At all events, this was the law until the decision referred to by Mr. Lass was overruled. His (the President's) opinion was that, with regard to the advantage of it, it would be very largely in the increasing confidence of the public as to the straightforward way in which the business of gas companies was conducted. It would be far more pleasant if the public were convinced that all was fair and aboveboard. The business of a gas company being necessarily a monopoly, the sting would be taken out of the complaints which arose therefrom, by openness in reference to the mode of conducting it. Beyond this, it would

be an incentive to gas managers; each would be stimulated by what he saw in the proceedings of another, and if there were any discrepancies apparent, it would naturally lead to an inquiry into the causes. It might, upon investigation, be found to arise from geographical position, or the difference in the value of the residual products. These things were all capable of explanation and proof, and, therefore, there could be, he thought, no two opinions as to the desirableness of the full and true accounts of everything, as provided by the form scheduled in the Act of 1871. That form seemed to cover every point, with the exception mentioned by Mr. Stephenson—viz., the consumption of gas by the public lamps. Mr. Lass said he did not know why that was left out. He (the President) thought he did—it was because it could not be put in. It was an unknown quantity unless the gas could be measured, and no doubt the draftsman knew that when gas was supplied at so much per lamp, the public had no interest in the matter, except to see that they got the quantity they bargained for. It was only to be done by estimate, and it was fortunate for his profession that there were a few things left in which their services were required, and which could only be settled by the application of skill, tact, and talent.

Mr. W. H. Bennett (London) read the following paper on

SOME OF THE CAUSES TENDING TO RESTRICT THE USE OF GAS AND COKE, AND HOW THEIR CONSUMPTION MAY BE INCREASED.

It might appear presumptuous on my part to address you to-day upon a subject in which I assume much more of your time is directly engaged than mine, were it not that for nearly 25 years my mind has been directed to all that concerns gas lighting with an interest scarcely less than your own.

From my connexion with the profession, and from your intimate acquaintance with me, you will, I am sure, give me credit for a desire to advance your interests, which are the interests of gas companies, the interests of gas lighting. It is said that lookers-on often see much more of the game than the players. Certain it is that they often see both sides of the play, while the players are more or less confined to the side which they take, and their views are consequently narrowed in proportion. If, however, I advance opinions and make statements that may appear rather too radical to please the tastes of some, let me assure them that they are made for the purpose of conserving those interests it is our duty to promote.

To start with, we may ask ourselves, Why is it that gas is not more generally adopted for both lighting and heating in private houses? I shall reply broadly to this by saying that gas companies, as a body, have never sought to make themselves popular, and as monopolists it is difficult to do so; but unless the suppliers in such case do make themselves popular, the use of the article supplied is sure to be more or less restricted. That gas companies are not popular is very evident. Let any one attend in the lobby of the House of Commons when any general gas question is about to be discussed, and seek the influence of the members on behalf of the companies, and he will hear remarks that will leave no doubt on his mind that, from some cause or other, gas companies have, whether deservedly or not, failed to become popular. The opinions you will hear expressed are gathered by the members from their constituencies—the public, the consumers. Now, why the companies have not made themselves popular with their consumers I do not know. Whether they do not sufficiently consider the requirements, convenience, and complaints of their customers I cannot say, but it is pretty clear the public think so; and the result, so far as the restriction of gas lighting goes, is the same, whether there is a good foundation for it or not. The very fact of having a monopoly is in general sufficient to excite, if not public antagonism, public suspicion, that sooner or later they will be, in some way or other, victimized, although that public should be the greatest benefiters thereby. I maintain that a judiciously regulated monopoly is the best source from which such an article as gas can be supplied, that competition in gas, although fraught with some advantages to the consumers for a time, always ends in either districting or amalgamation, when the consumer suffers as a consequence, and has to pay a price for his gas which will yield a profit upon an inordinate capital.

I never can divest myself of the notion that gas companies are nothing more than very large shopkeepers, save that they either, by force of circumstances or by parliamentary enactment, have a monopoly of the article in which they trade in their particular districts. Shopkeepers having no monopoly are, by competition, and by the hope of securing to themselves individually all the advantages of an increased trade, compelled to make themselves popular by studying and endeavouring to meet the wants, the conveniences, and even the whims of their customers. Does it not, therefore, become the more incumbent on the monopolists, by their liberal treatment—ay, and even by their forbearance—to show that, while their own interests are studied, those of their consumers are kept steadily in view, it being evident that if the public are well and cheaply served, the greater will be the consumption of gas. As it is, I fear that too often rules and regulations are made by companies which appear arbitrary to the public, and induce it to think that such rules are merely made to increase the profits of the company, and without consideration for those from whom such profits are derived.

On the other hand, I am quite alive to the fact that the public is a hard master to serve, individually suspicious, and collectively, in the form of local authorities, often most unreasonable and exacting. But is it not therefore the more desirable that companies should pursue such an open and liberal policy as will dissipate the too easily engendered suspicion of the private consumer, and conciliate the local authorities? I am inclined to think that both parties too often determine to stand upon what they consider their rights, rather than concede, fearing that such concession might be taken as an indication of weakness instead of liberality. All this sort of thing tends, if not to diminish the consumption, to retard its increase, and I would recommend all suppliers of gas to treat each consumer as if he were the person from whom the company must obtain their dividend. Do not, however, misunderstand me, and suppose that I would wish to see a servile and cringing, or anything-to-make-a-profit sort of policy adopted. That would be as distasteful to me as I am sure it would be to you. What I mean is, I would at all times endeavour to be in advance of public opinion, and be ready to yield with grace rather than court contention upon trifles that singly amount to nothing, but in the aggregate produce sufficient dissatisfaction to engender a troublesome, if not formidable, opposition.

I should be sorry to charge gas companies with apathy as to the extension of their trade, but I must say that, to a dispassionate looker-on, they never have seemed to exhibit that energy towards increasing the consumption that might be expected from an enterprising tradesman having unlimited capital at command, and under similar circumstances. Let me, however, save and except their conduct when they have had to contend with competition, for then, and then only, have they shown that vigour in endeavouring to increase their trade, which in ordinary commercial matters is necessary to ensure success. In the preceding, as in that which is to follow, I speak generally, and have no desire to make sweeping assertions without giving credit to those companies who may have been guided by a wiser policy.

Whether you agree with me in the foregoing remarks or not, I feel sure you will concur with me when I say, that when gas is supplied by companies they should be animated by a desire to increase the use of the commodity they supply, and whether supplied by companies or corporations it becomes the duty of the supplier to teach the public how best to use this commodity. In the case of corporations, it is their duty, because they allege always as a reason for becoming suppliers that they seek to do so for the public weal; and on the part of companies it is a duty to their shareholders, because the education of the public in this respect will inspire confidence, and of a certainty lead to a true economy, and before long will, with as great a certainty, lead to an increased consumption, and if not an increased dividend, at least to the maintenance of a full one.

And here I may say I think suppliers of gas have, as a rule, signally failed to do what I think is a duty. It may be said, where are the managers, and how is it they do not take upon themselves this duty? My reply is—and I do not say it simply to please you—they have enough to do under the present system, in the majority of cases, in preparing, planning, constructing, repairing, and keeping in going order a large plant often extending over many square miles; in manufacturing, purifying, and storing, under circumstances of frequent difficulty, besides the systematizing and supervision of labour that often present still greater difficulties. I had hoped to be able to congratulate the managers this day upon the relief they would sooner or later obtain by the repeal, or reasonable amendment, of the sulphur clauses which appear in many Acts, and to meet which occasion a distracting attention on the part of the managers, to the prejudice of many more vital subjects, without any corresponding advantage to the consumer. But this relief seems now more remote than I had anticipated. I think, however, that, wherever circumstances have permitted, and a manager has gone beyond what are considered as his normal duties, and occasionally taken upon himself to lecture or otherwise instruct the public in the use of gas, great advantage has been the result, not only in satisfying the public that their interests are not neglected, and so allaying a spirit of discontent, or nipping in the bud an incipient opposition, but in leading to an extended use or an increased consumption.

Now, in my opinion, companies ought to encourage the managers in this respect, or avail themselves of other means of teaching the true economy of gas lighting and heating. In almost all towns of any magnitude there are mechanics or scientific institutions where an occasional lecture, accompanied by practical illustrations from the manager as to the facility, utility, and economy of lighting and heating by gas could be demonstrated with great benefit to both consumer and gas company. For the purpose of illustration, manufacturers would be only too glad to lend such apparatus as may not be kept at a gas-works, for they lose no opportunity of advertising their wares, or exhibiting a spirit of commercial enterprise. It may be said that our friends Mr. Lewis Thompson and Mr. Rutter, our late friend Mr. James Sharp, and fellow-members, Mr. A. H. Wood, of Hastings, and Mr. Wm. Richards, have written much with the view of instructing the public. All honour be to these men, I say, for they have done much good. But I think when such men as the late Mr. Sharp, Mr. Wood, Mr. M'Crae, and Mr. West take upon themselves to lecture, they do infinitely more good for their own particular districts than any amount of pamphlet-writing could effect. People are more impressed with a good lecture, accompanied with illustrations and explanations as to why one system or one apparatus or one mode of lighting is superior to another for particular purposes, than they would be by giving them a score of pamphlets, which are too frequently cast aside unread. As an indication that this sort of treatment of the public is appreciated, I may quote a few words that fell from one of the audience who attended a late lecture by Mr. West upon the "Economic Consumption of Gas." He said that "he wished the gas company would assume a more active responsibility for the apparatus wherewith their product was consumed. The public should be accustomed to rely upon them for those suggestions and improvements in search of which they were now often made a prey by itinerant pretenders." As a further indication, you will always find these lectures well attended; and the remarks that fall, and the questions that are put after the conclusion of the lecture, show an amount of interest in the subject that is, at the least, very pleasing.

There is one point in the elucidation of which a lecturer has a great advantage over the writers of pamphlets, and that is the explanation of the meter. The meter is in the eyes of many of the public something worse than a conjuring-box, and is it not desirable that every means and every opportunity should be taken to dissipate the false impressions about this most useful instrument, which has played so important a part in promoting the consumption of gas? I say, is it not to the interest of gas companies to do all they can to enlighten the public in respect of this beautiful and equitable instrument, and thus remove the suspicions too frequently entertained towards it? And how can this be done better than by a lecturer who, with the apparatus in his hand, can illustrate what he is saying in a far more suitable manner than any books can afford? Teach the public, and when they have learned better, their prejudices will be removed, their confidence inspired, and their consumption will be the greater.

There is another thing I think should be encouraged by the gas companies more than it has yet been—that is, the use of gas for cooking. Much has been said and much written about the convenience and economy of cooking by gas, but, so far as I can learn, very little comparatively has been *done* towards promoting this object. Here and there, there is a company who has endeavoured to push the trade, and who lets stoves on hire, but it is by no means general. Our friends Mr. Goddard and Mr. Magnus Ohren have each accomplished as much as any one in this respect. The company that the latter gentleman represents I know lets stoves on hire. It is said, I believe, that such a letting involves some trouble, and that companies who did so years ago have ceased to supply them. This is questionable policy, for is it not our duty to cultivate a disposition to use gas for every available purpose? And we shall certainly fail in part to do that, unless we can offer to the public a means of making the trial with but small cost to themselves.

It has been reserved to the South Shields Gas Company, at the instigation of our friend Mr. Warner, to take a step with regard to the cultivation of the public taste for gas cooking and heating, that redounds greatly to their credit, and leaves them a worthy example to be followed. You are, no doubt, well aware that I allude to the exhibition of gas cooking and heating apparatus at South Shields, held in April last, where hundreds of articles, all varying in size, shape, and degrees of portability or adaptability to the uses for which they were designed, were to be seen. Many who are here can bear testimony to the great success that attended it; but there are few who were there the whole time, as I was, and can estimate the vast interest evinced by the public. It is stated that, in the five days that the exhibition was open, not less than 30,000 people were attracted; very many of whom expressed themselves highly pleased with what they saw, and complimented the company upon the course they had taken—namely, that of instructing the public in the advantages derivable from the use of gas. No amount of pamphlet writing or distribution would have the effect that I am sure will follow. Such an exhibition can only result in an increased consumption.

There is another thing which tends much to the restriction of gas used in

private houses, and that is, the miserably bad manner in which the fittings are often put up. The prospective consumer, not being invited by the gas company to seek advice at its office, goes to two or three gas-fitters, and probably enters into an arrangement with the one whose price is the lowest, and very likely the least capable of advising. In a short time, from exceedingly small pipes, placed at a wrong inclination, or sharp bends, there becomes a deficiency at the burners, or dancing lights ensue. Whose fault is this? The gas-fitter's? Oh, no; never! It's the bad gas! The fault of the company! at least, so the consumer tells his neighbour, and he has the authority of the gas-fitter, who is not inclined to admit that the fault lies with him. Now this, through ignorance on the part of the consumer, causes great discontent, and he does not hesitate to ventilate his dissatisfaction at every possible opportunity. But much, very much, of this might be obviated if the gas companies did the fitting, or had control up to the point of combustion. I am told that companies avoid the fitting business very often, and have shunned seeking control up to the point of consumption, for fear of making themselves liable for any accident caused by explosion or otherwise. If a gas-fitter puts up fittings badly, and an accident occurs, he is seldom made amenable for it; but if a gas company did the work, it is quite certain that an endeavour would be made to make them responsible for any injury arising. If, however, the gas companies had acted wisely, I think they would, ere this, have acquired, by general parliamentary legislation, power to supply and erect fittings, and to let fittings on hire with some control up to the point of combustion, and with some sort of limited liability. They have exerted their power reasonably enough at times; why not exert it in a direction so likely to result in the extension of their trade? The Wallasey Improvement Commissioners, in their Act of 1868, obtained power to make bye-laws for this sort of control, and the Leeds Corporation sought similar powers this year; but the Chairman of Commitees of the House of Lords would not permit their remaining in the Bill, alleging that if such powers were requisite they should be obtained through a general Act; and although I was sorry to see that the Leeds people lost the acquisition of these powers, I concur in the reason that general legislation upon such a subject would be more desirable.

I am not one of those who are ready to exclaim on every occasion, "They manage all these things better in France," greatly as I admire some of their institutions; but I must say, and I say it with regret, on our own account, that there are many things to be copied with advantage from our Parisian and other continental neighbours. The Paris Gas Company have done, and still do, much to induce the public to become consumers of gas. Connected with their general offices, there are show-rooms, containing fittings and stoves of all descriptions, with attendants ready to explain and advise the consumer as to what is most appropriate for his requirements. Besides this, the company offer to place a "*conduite montante*," or service-pipe, into every house, and allow the proprietor 100 francs (£4) if he will introduce fittings into three apartments, each fitting to consist of three burners, and they reckon as a burner a junction prepared to feed a heating apparatus; and for every additional fitting of three burners the company will allow a premium of 30 francs (25s.). You are, no doubt, aware that the houses in Paris are mostly let in flats, and are built upon somewhat the same principle that some of our Scotch friends know so well. Here again, if a lodger requires gas, and a service-pipe has already been laid in, the lodger will receive a premium of 30 francs for each fitting of three burners. These and some other premiums which the would-be consumer may obtain from the company, go far to pay the cost of his fittings; and thus, on the score of expense, leaves him but little excuse for not using the cheapest and most convenient light-giving agent. In this country, so far as I can learn, no approach has been made to such liberal terms as these. It may be said, in reply, that the Paris Gas Company charge a high price for their gas, and make such a profit as would cause the very hair of the cheap gas agitating fraternity of this country to stand on end. It is true the Paris Gas Company do charge a high price, and they are not limited to 10 per cent., but that is no reason why the liberal principles they display should not be followed, if not to the same extent.

And now with regard to coke. What is the reason that coke is not used more than it is in private houses? I am convinced that the chief reason is because the form in which it is supplied from gas-works is too large for convenience, and requires to be broken before it is fit for use. It is a common complaint that servants will not use it if they can possibly avoid doing so, and I believe the cause is the labour and trouble the breaking of it entails. But why do not the companies break the coke, and supply it in a more convenient form? It is said, because the breaking involves expense, and produces much breeze, which in many places is unsaleable; but if such an instrument as I hold in my hand, and depicted on the diagram, were used, the coke might be broken with a minimum amount of labour, and the breeze greatly reduced. You will observe it is somewhat like a hammer, with a chisel edge at one end, and at the other has four prongs, like the four fangs of a double-tooth. This, when attached to a hazel or other elastic handle, forms so very excellent an implement that it has only to be tried to ensure adoption. The coke, when broken, may then be riddled through an apparatus, of which a diagram is exhibited. It consists of a frame or case divided by partitions, and within which a cylindrical sieve, having three or more divisions, is made to revolve, at an angle more or less inclined to the horizon. Each division of the sieve is of a different mesh, so that when the coke is introduced, and the cylindrical sieve made to revolve by turning a cranked handle, the finer parts of the coke will fall into the first compartment below, the next in size will pass on to that part of the sieve with the next larger mesh, and fall into a corresponding compartment, while the bigger pieces of coke will travel on still farther, and fall through the largest mesh into its appropriate receptacle. Thus the coke may be separated into three or more sizes to suit the wants of different classes of customers. If such a plan were followed, I have no doubt a much more ready sale of coke would be afforded, and at a price that would prove more remunerative. As a proof of this, I have a return from a town in the vicinity of Paris where the coke is screened in the manner I have described, and divided into four sizes. The coke as produced from the retort is charged a certain price; but

For No. 0, about 0·394 to 0·787	{	cubic inch in size, the company charge 2s. per chaldron extra.	
For No. 1	„	0·787 to 1·575	Ditto 4s. 1½d. extra.
For No. 2	„	1·575 to 2·362	„ 2s. 9½d. „
And for No. 3	„	2·362 to 3·150	„ 1s. 4½d. „

The gas company have also a number of depôts established in different parts of the town, thus offering great facility to the poorer as well as the wealthier classes for obtaining what they want in either large or small quantities, and of a size to suit their requirements. There is nothing new about this; both the system and the apparatus have been in use in Paris and other places on the Continent for many years, and English engineers are acquainted with the facts, but why they have not introduced the system here is a mystery to me. Where the breeze is an unsaleable article, it might be converted into artificial fuel, by passing it, together with a small quantity of tar, through such a machine as Mr. George Anderson brought to our notice years ago, and thus find a market. Such a system would yield an increased revenue to the gas company, and show a disposition to give the consumer all the advantages the presence of a gas-work could afford. I am sorry to say, however, that the very opposite policy occasionally prevails, for very recently a case was brought under my notice in which the gas company, having a large stock of coke on hand, entered into an arrangement with a contractor to supply him at 6s. per chaldron, upon condition that it was disposed of out of the town, in order to keep up the price in the town and amongst its own consumers to 11s. I am told that this is not a solitary case; but I should hope, for the honour of gas companies, that it is, for such a policy cannot be too highly deprecated.

There has been very little written about the advantages of coke for house consumption. Our ever-active friend, Mr. Warner, produced a little *brochure* some years ago, containing extracts from different authors, and interspersed with some original matter upon this subject; but that is about the only thing I have seen done towards convincing the public that coke is really an excellent house fuel, and superior to coal for some purposes.

Here again the Paris Gas Company have shown more enterprise, for they undertake to supply any number of stoves specially adapted to the burning of coke and artificial fuel at cost price, and so allow the consumer to test the applicability and economy of these fuels at the least possible expense to himself. Surely this is a matter worth considering by our own companies.

I now come to a part of my subject that more immediately concerns you as managers, and I feel some delicacy in touching upon it lest I should be misinterpreted. I believe that gas managers, as a body, are as honourable a set of men as one can find, zealous in the performance of their duties, and jealous of their integrity. I believe that each one of you thinks he is doing his utmost to promote the interests of, and secure the best dividend he can for, his company; but if a system of remunerating managers in proportion to results were introduced, I think in a very short time every manager would find that he could surpass his former self. I believe that we often sincerely think that we are doing our very best, when, if our direct interests were awakened by the certainty of reward for increased exertions, we should make efforts, of which we now know not our own capability. That such a system of remuneration may present difficulties I am aware, but I am satisfied they are not insurmountable. It is impossible to lay down a scale that would meet all cases, but I think it is quite possible to frame a general rule that might serve as a basis for modifications to be adapted to particular instances, and I am quite sure that if such a system were adopted, you would profit greatly by the change, not only pecuniarily, but morally, for you would feel more independent; you would then demand as your right an increased reward which you now have often to wait for until long after it is earned, and then receive it as a favour. Sdch a system would, I believe, do more towards cheapening the price of gas and maintaining full dividends than any scheme ever tried, and in proportion to the cheapness of gas, so also would be its increased consumption.

Upon the same principle I could say let the manager participate in the profits arising from increased consumption. Give him, I will not say *carte blanche*, but more liberty to act untrammelled, and more in the capacity of a gas manager than as a mere gas maker, and we shall very soon find that the increased consumption will be greatly in excess of the present average 10 per cent.

As a proof that this reasoning is well founded, do we not often find that a lessee can afford to pay a company a fair dividend, and still make a respectable profit for himself? Why is this? It is because he knows that his profit depends upon, and will be in all probability in proportion to, his own exertions.

If the foreging remarks have the effect of directing your thoughts into channels that have not yet been sufficiently investigated, or in any way contribute to the objects for which we are assembled, I shall be much pleased, and consider myself well repaid. If, however, you think that these observations have been made in too censorious a tone, and that I have taken the side of the consumer rather than that of the supplier, rest assured that I have done so under the firm conviction that the true interest of every supplier is to study the interests of the consumer, and that while I am most anxious to see a greatly increased consumption of gas, I am equally anxious to witness the increased prosperity of every one connected with the science of gas lighting.

Mr. WARNER (South Shields) regretted that this paper had been put down last on the list, as there was much suggestive matter in it, and unfortunately no time was left for its discussion. He had long since held that it was not only the duty of managers individually, but also collectively, to furnish instruction to gas consumers. His opinion was that, as an Association, they should not meet in any town without having some instructive public lecture given. He was quite sure that it would be attended with beneficial results.

Mr. SELLERS (York) said the company with which he was connected were very popular, because they studied the interests of the public. They did a large share of the gas-fitting business in the city, and that enabled them to see that the fittings were put up properly. With regard to the suggestions in the paper just read, he thought all the members would be agreed. Touching upon the use of coke, he remarked that in York for two or three winters, consequent upon the depression of trade and the unusual mildness of the season, they had had some difficulty in getting rid of their stock. They had, however, very successfully combated the difficulty by the issue of a circular calling the attention of the public to the economy of coke as fuel, and by having their own horses and lorries, so as to be able to deliver the coke at the consumers houses.

Mr. G. ANDERSON (London) said he was happy to find himself in thorough accord with the writer of the paper. The first business of a gas manager was to provide an ample supply of gas as pure as possible, and then he had nothing to fear. It was, of course, his duty to be polite, but he was not called upon to be sycophantic. Let him do his duty, and no one was more entitled to respect than the gas manager; and, for his own part, he had always found that, in the end, he gained the confidence and esteem of his consumers. He would only remark, in reference to the paper, that he looked upon the suggestion to break up the coke as an admirable one. For a number of years he had been in the habit of having it broken up with hammers, but he had since devised a machine for more satisfactorily accomplishing that purpose. No doubt a great deal of the prejudice against the use of coke arose from ignorance. Unfortunately, domestic servants were not philosophers, though Board schools in time might make them so. As to giving managers an interest in the work done, and for extra skill employed, he quite agreed in the remark. Under such conditions they might, without knowing it, introduce improvements never thought of before.

The PRESIDENT said he thought no one present had more ground for grumbling than himself. It appeared now that the most valuable people in the world were lecturers, and poor wretches like himself, who wrote pamphlets, were no good at all. He had only lately taken to pamphleteering, and after what had just been said he thought he had better at once leave it off, although hitherto it had only been done under the pressure of circumstances, and for the sake of amusement. But, after all, he must admit it was quite true lecturing or talking was the thing. One could not always be writing, but one could be always talking, and no doubt good

impressions were produced among consumers if one could only get their ears. Let them clearly see that the gas manager understood his business, and that he had nothing to conceal, and let them understand that the interest of the gas company was *their* interest.

LIVERPOOL CORPORATION WATER ACCOUNTS.

The Annual Accounts just published give the following particulars:—

Receipts.

Water-rents, &c.				£100,102	15 1
Water for shipping				10,791	11 9
Water for sundry purposes				1,913	11 3
Water-rate				62,138	14 1
Rent of meters				1,118	12 10
Borough-fund (under Water Act, 1862)	£2000	0 0			
Borough-fund (under Sanitary Act)	500	0 0			
				2,500	0 0
Rents and miscellaneous receipts				215	14 10
Income-tax account				1,094	12 7
Rent of pipes				19	8 2
Chorley works				3,289	14 1
				£183,184	14 8

Expenditure.

Interest				£92,963	15 7
Bootle springs				1,000	0 0
Bootle engine station				1,739	11 3
Aubery Street ,,				1,204	6 1
Dudlow Lane ,,				3,136	7 4
Green Lane ,,				3,146	17 9
Windsor ,,				1,033	15 11
Bevington Bush ,,				47	15 8
Hotham Street ,,				112	0 9
Wm. Henry St. ,,				15	5 11
Prescot ,,				369	7 6
Reservoirs (home)				253	5 0
Town distribution				6,082	5 8
Stand-pipes				300	18 1
Constant service				2,193	9 2
Private plumbing				1,763	3 9
General repairs				16,568	19 1
General expenses				1,785	14 0
Treasurer's department				5,357	12 10
Shipping ,,				1,604	10 2
Engineer's ,,				7,823	3 8
Auditor's ,,				293	14 7
Law and parliamentary expenses				113	13 9
Rates and taxes				8,495	17 4
Mortgage stamps				32	16 3
Officials guarantees				68	9 6
Rivington works				9,216	16 7
Chorley works				2,589	14 6
Total				£169,223	7 8
Depreciation-fund				12,000	0 0

Extraordinary Receipts.

Land and premises account (Windsor and Bevington Bush Stations)	£1,832 0 0
Plant account	3,568 0 4
Depreciation-fund account	15,243 8 1
	£20,643 8 5

Extraordinary Expenditure.

By amount paid on account of—		
Mortgage account	£6,755	12 4
Extensions of pipes, &c.	7,900	11 11
Stock account	2,151	17 8
Rivington construction	6,293	11 4
Chorley Water-Works	108	17 10
	£23,210	11 1
Investment of depreciation-fund	15,243	8 1
	£38,453	19 2

Balances.

Ordinary account—		
By balance in the hands of A. Heywood, Sons, and Co.	£17,219	1 4
In hands of engineer	105	0 0
Capital account—		
Due A. Heywood, Sons, and Co.	6,439	10 7
	£23,763	11 11

THE GAS, SEWERAGE, AND WATER-WORKS QUESTION AT ST. NEOTS.

At the Monthly Meeting of the St. Neots (Hunts) Local Board on Tuesday, the 3rd inst., Mr. George Bower, the chairman, in accordance with a notice given at the previous meeting, brought forward the gas, sewerage, and water-works question.

Mr. Bower said: The subject which I bring before you is one which I feel cannot any longer be delayed without imperilling the best interests of the district which you and I represent. We have, as you know, constant reminders from the Local Government Board, asking us what we have done towards remedying the defective state of our water supply and sewerage, as reported upon by Colonel Ponsonby Cox, after a personal inquiry by that gentleman. Excuses can be made—and the Local Government Board may be satisfied with them for a certain period—but we cannot play with such a body for an indefinite time; and, therefore, the sooner we take the matter in hand ourselves, the better it will be for the ratepayers. Government engineers, as a rule, are not particularly mindful of ratepayers pockets. Before proceeding further, it may be well to glance, from a sanitary point of view, at the actual condition of things which at present exists within the district, and he would be a bold man who would venture to assert that either a good supply of pure water can be obtained, or that our sanitary condition is what it ought to be. Many members of the local board are, perhaps, better acquainted than I am—by personal observation—with the state of the great bulk of the houses in the district; but, bad as I have for a long time thought the underground condition of them to be, I must say that I never thought it half so bad as it really is; and I state most emphatically that it is of God's mercy we are in such a comparatively healthy condition. It does not, however, follow, that because the death and illness rates may be somewhat low, they may not be much reduced by proper sanitary measures. The subsoil of the district is generally gravel lying on clay, and the majority of the cesspools are built in half brick—neither puddled with clay nor cemented inside—the idea being that the function of a cesspool is to catch the solid matter and let the liquid go where it can. The drains which have been laid to and from them are equally unsound at the joints, and the consequence is that the whole ground is saturated with sewage, and though there is "water everywhere," there is scarcely "a drop to drink." Again, consider the fact that the churchyard and other burial grounds are in our midst, and that bodies must, of necessity, be buried in our only water-bearing stratum, and the wonder is, not that there is so much bad, but that there is any good water at all. Careful analyses have been made of the water from a number of wells selected indiscriminately, and most of them were found to be bad, and this state of things must continue until we can obtain a supply which is not, and cannot be, polluted by local neglect. Our forefathers left us a precious inheritance of hidden dirt, which I fear will have to remain where it is for many generations to come; but the paternal Governments of the present day, without respect of party, refuse to allow us to go on contaminating the subsoil, and we are commanded to remove the filth we now make, and to leave posterity the means of removing theirs too. If it be—as I believe it is—better for us to take action in the matter ourselves, rather than leave it to be taken by Government, it will be well now to consider what is the best course we can adopt at the least expense, and how the money is to be raised to enable us to carry out what we may ultimately resolve upon doing. A proper supply of wholesome water is a necessary of life, to provide which should be one of the first duties of a public body; and scarcely less so is that of artificial light; while the removal of filth is a necessity for endurable existence. I believe it will be to the advantage of the ratepayers that the whole of these works, and the management of them, should be in the hands of the local board; and this is becoming the general opinion of the country, for, year by year, already established gas and water works are being acquired by local authorities, either by agreement or by arbitration. The value of such works is materially affected by the consideration whether they exist by virtue of a private Act, or Provisional Order under the general Act, or without statutory powers. A favourable opportunity exists at the present time for the purchase of the St. Neots Gas-Works by private arrangement, and, after the fullest consideration, I have come to the conclusion that it will be alike advantageous to the ratepayers and the shareholders for this board to acquire them. It may, and probably will, be said that the works will not be managed properly; but why should a local board, which, as a rule, embraces the best men of business of the district, manage worse than directors of a company, whose qualifications for that office are estimated more by the number of shares they hold than by their business capacity? It may, moreover, be stated that it will be injudicious to purchase them, on the ground of the probability of some discovery being made which may supersede gas made from coal; but this has been the cry for the last 50 years, and discovery upon discovery has been announced as heralding the total eclipse of gas, but all of these have failed, and, in my opinion, will continue to fail, so long as coal can be obtained as plentifully and as cheaply as it is likely it always will be in countries like England. If, however, there should be a discovery, will not the local board be as ready to adopt it as the rest of the world, and thus be in no worse position, relatively, than others who, regardless of possible discoveries, have invested hundreds of millions of pounds sterling in gas-works? If we are to wait for the best of the future, we deprive ourselves of the advantages of the present. The expediency of the local board becoming the owners of the gas-works lies in the consideration that to them belongs the duty of lighting the streets, and the right to break them open, and the power to prevent others from doing so; while the ratepayers require that their interests shall not be neglected in such an important matter as that of the supply of gas. The benefit to the ratepayers by the purchase I will make apparent presently. If the members of this board should resolve, after mature deliberation, that it will, in their opinion, be to the advantage of the ratepayers that the purchase should be effected, I anticipate there will be no necessity to attempt to obtain them other than by friendly agreement. The question which now naturally presents itself is, what will be the cost of these various works, and how are they to be paid for? The gas-works already exist, and when the alterations which the company are now carrying out are completed, they will be in a position to supply the united districts of St. Neots and Eynesbury for many years to come, without additional capital outlay. The supply of water would, in my opinion, have to be taken from above Eynesbury, as the flow of the river, and of the water in the gravel bed which underlies St. Neots and Eynesbury, comes from thence, and through the inhabited portion of the local board district. I think the first thing to be done is to obtain a good supply of water, as, after it has been used for domestic purposes, it then becomes the motive power for the removal of sewage matter. It would also, of course, be ready in case of fire, and for watering purposes. As for sewage, the great difficulty, in my judgment, lies in small towns attempting too much, and in not taking care that the sewage shall be as little diluted as possible. Lord Palmerston said that dirt was "matter in the wrong place," and so long as we look upon sewage as dirt in the wrong place when it is deposited in cesspools such as I have described, and if we do not attempt to make manures at a cost of £5 per ton to have to sell them at less than £2, we may steer clear of some of the mistakes into which others have fallen. Sewer-pipes, when laid, should be perfectly tight at the joints, but I must confess that I have seen very few that are. If they are not, and if they allow sewage to escape, we are no better than we were so far as the saturation of the ground is concerned, while, if they admit outside water into them, the sewage is very much diluted, and if it has to be pumped the cost is greatly increased by the influx, and this, I believe, is very frequently the main cause of sewerage works not even paying expenses. Whatever plan of sewerage we adopt, we must be very careful in having the pipes so constructed as that sound joints can be made, a matter which, as I have shown, is of the greatest importance, but not at present sufficiently appreciated by sanitary engineers. I now proceed to consider the cost of carrying out these various works. The value of the gas-works prior to the commencement of the alterations now going on was £4200, reckoning the £10 shares at £14, which I am informed was the full market price. Add to this the cost of the alterations—say £3000—and we have the sum of £7200 as the maximum amount which, in all probability, the local board would have to pay for them, the company taking the profits of the concern up to the day of transfer, and retaining any reserve-fund they might happen to have. The cost of the water-works I estimate at £4000, and of the sewerage at £3000, as we have now a larger district than we had when Mr. Hennell made his report for the late commissioners, for St. Neots alone. Engineering and other expenses would in all probability bring up the total expenditure to £15,000 as the sum required to purchase the gas-works and to construct water and sewerage works. This, at the first blush, seems a large sum to have to provide, but I will now show how it can be raised, and with what effect on the ratepayers pockets. The money can be borrowed on the security of the rates of the local board district, either from the Public Works Loan Commissioners, or from other sources. About this there will be no difficulty when we have the sanction of the Local Government Board to raise the sum. The net rateable value of the district exceeds £15,000, and frequently local boards are allowed to borrow more than double the amount of such value. It should, of course, be the duty of the board to obtain the loan at the lowest possible rate of interest, and to spread the repayment of principal and interest, by equal yearly payments, over as long a period as possible, because the gas-works and the other works which we shall execute will be kept as going concerns, and maintained; and while it is right and proper that we should take upon ourselves a considerable portion of the burthen, yet I cannot see that we should relieve our successors from paying some of the cost of works which will then exist, and from which they will, perhaps, derive more benefit than we shall have done. My belief is that the board will be able

to borrow the money at 4½ per cent., repayment to be made by equal yearly instalments extending over a period of 30 years. It now becomes necessary to consider what will be the income from the whole of the works. Notwithstanding that the price of gas has been recently reduced to 5s. 10d. per 1000 cubic feet, a net income of £450 may be relied upon one year with another, as the cost of management by the local board will be less than it now is, and the cost of producing the gas will also be less when the extensions now going on are completed. I calculate that for the first year after the water-works are started, expenses only will be paid; the next year a profit of £50, and a similar rate of increase for four other years, until the profit will be £250 a year, based upon a charge of 5 per cent. upon the rateable value of the houses taking the water, and such other price for manufacturing purposes as may be agreed upon. As for sewage, while I think there *may* be a profit from it before the expiration of six years from the completion of the works yet it is safer not to reckon upon any for my present consideration of ways and means. It will thus be seen that I am calculating upon a net income of £700 a year from all the works at the end of six years. In many cases, until the works are developed, the Local Government Board have allowed local authorities only to commence repaying principal after three or four years; but, assuming that we should have to commence repaying it immediately, then what is the annual sum required to repay principal and interest at 4½ per cent., extended over a term of 30 years? The amount is £893 15s. Now the profit of the gas-works would be, from the day of transfer, at the rate of £450 per annum, leaving £443 15s. to be provided for the first year; and, assuming that the rateable value of the property does not increase—an improbable event—a tenpenny rate for this special purpose will be required, in addition to our regular wants; and as I only estimate the profit of the water-works to commence the second year at £50, and to progress at the rate of £50 a year until they reach £250, I think I am very moderate, especially as I believe the day is not far distant when Government will enact that where there is a good and sufficient supply of pure water obtainable from any water-works, it shall be unlawful for private persons to supply themselves from wells on their own premises, for domestic purposes, in populous districts. During the six years, the average rate per year for these special matters will not exceed sevenpence in the pound, and, in the event of no further profit accruing after that period than that already calculated upon, less than a 4d. rate will henceforth supply the deficiency to make up the annual sum required for interest and the repayment of principal. If the sewerage works be not carried out for the present, our expenditure will be reduced by £3000. The annual amount required to pay off the principal sum of £12,000, with interest at 4½ per cent. by equal yearly payments during a period of 30 years would be £715. The profits on the gas and water works would, at the end of six years after completion of the latter, be sufficient to provide this without calling upon the ratepayers for a farthing. It has been urged by some writers that it is unfair to purchase or erect gas and water works by a local board, and make a profit out of the consumers of gas and water, and apply this profit to the relief of the ratepayers generally, instead of reducing the price of gas and water; but I fail to see any injustice in so doing, if the fact only be borne in mind that the money for the purchase or erection of the works is obtained at a much lower rate of interest, because of the better security which the rates of the district give, than the works themselves would give. The general price paid for gas-works in a state of efficiency, when without statutory powers, is about 16 years purchase of the net profits; and so long as consumers pay no more for their gas than will continue to the purchaser the same rate of profit on which the purchase price was based, then the difference, which is entirely due to the better security the ratepayers can give, legitimately and properly belongs to them. If it were otherwise, then the consumers would get the profit at the expense of the ratepayers. You will have observed that I have not put before you a scheme for the execution of the works, but a plan by which we may provide the means for carrying them out. From my practical knowledge of such matters, I shall not be far wrong in my estimates of cost, and I confidently put my views before you and the ratepayers, as I believe them to be sound, and that (for us) a great work may be accomplished with comparative ease, a work which will be of inestimable benefit, not only to us, but also to those who come after us.

After some little discussion, it was resolved that a special meeting should be held on Tuesday, the 17th inst., at ten o'clock, for the purpose of taking into consideration the statement made by the chairman, and ascertaining whether the gas company would sell their works, and at what price; and that the thanks of the board be given to the chairman for the trouble he had taken in laying the matter so clearly before them.

DUMBARTON GAS-WORKS.

On the invitation of Mr. M'Gilchrist, manager of the Dumbarton Corporation Gas-Works, a large and influential party of gas managers, from different towns in the West of Scotland, met at those works on Friday, the 29th ult., for the purpose of inspecting some important extensions that are at present in progress, or have recently been made, by Messrs. William Brodie and Co., of Paisley. The party included gentlemen from Greenock, Port-Glasgow, Motherwell, Barrhead, Coatbridge, Lanark, Helensburgh, Alexandria, Kirkintilloch, Irvine, &c. Amongst the extensions in question there is embraced an ingeniously devised gas-exhauster, which was seen in operation, and described by Mr. M'Gilchrist and Mr. Brodie, and which may be said to have been the prime object of the visit and inspection. While it is the first of the kind made by Mr. Brodie's firm, it was found to work most smoothly, and to be exceedingly sensitive to the least alteration of pressure. Mr. M'Gilchrist spoke of it as having given him the very greatest satisfaction, and it was much admired by the practical men present. A brief description of it may not be out of place.

Along with the exhauster, properly so called, there is combined a small steam-engine, and both pieces of mechanism are of the vertical type, and are placed on the same sole-plate, which is of cast iron, and measures 7 feet long by 4 feet broad. They both reach to a height of about 6 feet, measuring to the centre of the shaft. The cylinder of the exhauster is 13 inches in diameter, with an 18-inch stroke, and is capable of passing about 10,000 cubic feet of gas per hour, with the engine making 60 revolutions per minute. The steam cylinder has a diameter of 7½ inches, with a stroke of 14 inches in length. On the end of the shaft there is fitted a disc, which is provided with a regulating screw capable of reducing the stroke of the exhauster to almost any length, and certainly down to 6 inches. The piston-rods are made of steel, while the eccentric straps and casing glands are of brass, and the shaft, connecting-rods, and cross-heads are of malleable iron. All the malleable ironwork, together with the covers of the cylinders, the casing covers, the rim of the fly-wheel, &c., is highly polished, and all the ironwork which is not polished is painted in a very chaste and ornamental manner and varnished. The framing of the steam-engine is supported by four fluted columns, and both framing and columns are modelled in the Tuscan style of architecture. Both the inlet and outlet pipes of the exhauster are provided with inlet, outlet, and bye-pass valves, none of which require to be handled, unless when the exhauster is under examination or repair, owing to the fact that it is fitted with an improved form of combined regulator and bye-pass, the former of which, while the exhauster is working, regulates the vacuum or pressure on the hydraulic main, while the latter, in the event of the exhauster stopping suddenly from any cause whatever, immediately comes into action to perform its proper functions. The regulator is counterbalanced by two sets of ornamental weights, suspended over pulleys by means of brass chains, which can be so nicely adjusted as to give the desired vacuum or pressure, regardless of the speed at which the engine is running. Everything is arranged in the most compact manner, and reflects very much credit on the taste and professional abilities both of Mr. M'Gilchrist and Mr. Brodie.

Owing to the immediate and prospective wants of Dumbarton, in respect of its gas supply, greater storeage power has for some time been deemed very urgent; and, in order to provide for the future, Messrs. Brodie and Co. have just "telescoped" a 50-feet gasholder, which has long been in service, by adding to it a lift of 16 feet, and made various other alterations and extensions. Arrangements are also in progress for considerably increasing the gas-making power of the works by the erection of a bench of four large retorts. Another feature of the visit to the Dumbarton Gas-Works was the inspection of one of Mr. D. Bruce Peebles's gas-governors, the first of the kind erected at any works. It was minutely scrutinized by the visitors, while Mr. M'Gilchrist described its construction, and illustrated its mode of action. He also spoke of it as a most effective and reliable piece of mechanism.

After carefully surveying the whole of the works, which seemed to be under excellent management, the party went upon a visit to some of the "lions" of the town, including the ancient fortress so famous in Scottish history, the new pier, and Messrs. Denny's extensive ship-building works, from which so many of the celebrated Peninsular and Oriental liners have been turned out. They were courteously conducted over those works by Mr. Ward, the general manager of the establishment, and very cordially received by Mr. William Denny. They also visited and inspected the drawing and model rooms, and were hospitably entertained before leaving. The party subsequently met at dinner, Provost Rogerson presiding, supported by Bailie Thomson, convener of the Gas Committee; Mr. Samuel Stewart, manager of the Corporation Gas-Works, Greenock; Mr. Brodie; and Mr. Monk, past-president of the West of Scotland Association of Gas Managers, &c. Mr. M'Gilchrist occupied the croupier's chair. Several toasts suitable to the occasion were proposed and responded to. Both Provost Rogerson and Bailie Thomson, in the course of their remarks, spoke in very high terms of the manner in which Messrs. Brodie and Co. had fulfilled their contract, and of the great satisfaction which Mr. M'Gilchrist had given the Gas Committee of the Dumbarton Town Council since becoming their confidential adviser and the manager of the works. All the visitors left for their respective destinations greatly delighted with Mr. M'Gilchrist's kindness, and deeply indebted to him for the trouble he had put himself to in order to ensure their comfort and enjoyment. Later in the evening the men employed by the contractors and on the works were entertained to supper by Messrs. Brodie and M'Gilchrist.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The week has been a very quiet one in all respects, hardly any single department having been doing an average amount of business since my last report was written. At many of the large works here and in the district there has been the usual Midsummer interval for stock-taking—a process which lasts about three weeks, during which period the works are laid off, and the workmen perforce rendered idle. In the present state of affairs, however, this interval is a welcome one rather than the contrary, inasmuch as none of the works, in any branch of business, are doing more than what is to all intents and purposes a hand-to-mouth trade. Under these circumstances, and also bearing in mind the general suspension of purchases which accompanies the end of the quarter, it is not a matter for the least surprise that the pig iron market should have been quiet throughout, with a decided disposition on the part of smelters to accept rather less money for current deliveries. In some quarters, nevertheless, the pig iron vendors and producers are unwilling to enter into long-dated forward contracts, except at a slight rise on the present prices, and base their firmness in that respect on the fact that they have recently had so many inquiries that they anticipate a decided change for the better early in the autumnal quarter of the year. Buyers, however, refuse to entertain this idea, and urge that there can by no possibility be any alteration for the better until the war is seen to be drawing to an end. In the meantime, some of the leading founders are doing a pretty fair amount of business in colliery castings on large gas and water mains, and in gas-making plant.

The general condition of the coal trade is hardly up to the average of the season, although the call for steam coal has kept up that class of shipments pretty well. In steam and gas coal there have been several contracts, mostly small, placed during the week, the latter class being for Lancashire and Yorkshire gas undertakings. House coal is very quiet.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The coal market here is in a depressed and unsettled condition. Consumers who are not compelled to place their orders are holding back in the expectation of lower prices, and supplies are abundant, colliery proprietors finding it impossible to move all their present production of round coal, and where the pits are working full time, stocks are accumulating. There are a few contracts for gas coal in the market, but the business doing is still only limited, buyers not being at all anxious to place their orders just yet. The strike in the Wigan district, from which large supplies of gas coal are received, has naturally, to some extent, interfered with this branch of trade, but the struggle is, to all appearances, now approaching a conclusion. Small batches of the men have, during the last few days, returned to work at many of the collieries, and although most of the principal pits are still idle, it is not likely the miners will hold out much longer. But whether, when work is resumed, coalowners will be disposed to accept gas contracts on lower rates is doubtful, and certainly no material alteration in rates is to be looked forward to. The prices at which sales have been made range from 7s. 9d. to 8s. per ton for ordinary descriptions of screened gas coal, and for mixed coal and cannel about 9s. to 9s. 6d. per ton at the pit is asked. Good cannel is firm in price. House fire classes of coal meet with very little demand, and common coal is a drug. The pit quotations are about 10s. to 10s. 6d. for good Arley, 8s. to 8s. 6d. for Pemberton four-feet, and 6s. 6d. to 7s. for common coal. Burgy is in tolerably good demand; but the common sorts are plentiful, and offering at low prices. For good qualities the average price at the pit mouth is 5s. 6d. per ton. Consumers of slack still find it difficult to meet their requirements, and have to pay full prices to obtain supplies, the better sorts ranging from 4s. 6d. to 5s. 3d. per ton at the pit.

The iron trade is still in a very depressed condition; prices continue to move downward without bringing forward new business, and it would seem that the more makers give way the less disposed consumers are to buy. Lancashire makers seem disposed to make a stand for late rates, but

they are being completely undersold by the north country firms, who are securing what little business there is to be done in this district. Finished iron is without improvement. Very few orders are being given out; but although some of the makers are taking rather less money, most of the local firms are holding out for £6 12s. 6d. for Lancashire bars delivered into the Manchester district.

THE COAL AND GENERAL TRADE OF THE NORTH.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of the North has become dull. Little trade is doing amongst the merchants, and no orders are in the market. The best gas collieries very rarely lose much time. The most of their output has been sold under contracts, which run over the whole of the year. The quoted price upon the Quayside is generally maintained by sending a good deal of the surplus off to the South by steamers upon consignment, and quoted rates remain nominally the same as last week for this quality of coals. It is about 8s. per ton. The medium and second-class gas collieries are doing a scrambling sort of trade. Prices vary considerably. The lowest figure is about 6s., the highest 7s. There is no demand for house coals, 11s. per ton is the rate on the Tyne, and 12s. for the very best on the Wear. The best steam collieries are moderately well employed, but second-class pits are not doing a great amount of work; 12s. is the nominal figure for best steam coals; from 9s. 6d. to 10s. for seconds. Small and inferior coals of all kinds hang heavily on the market. To-day (Tuesday) a Court of Arbitration will be opened in Newcastle to deal with the wages question in the Northumberland coal-field. Mr. Herschell, Q.C., is the umpire. The ultimate decision will, no doubt, have to be made by him. The masters will attempt to prove that higher wages are earned, and fewer hours are wrought, in the Northumberland collieries than in any other mines in the kingdom. Of course the men will have their answer, and the final decision will be left with a competent legal authority, who is perfectly independent of either side. He receives no fee for his services.

The shipping trade of the north-east ports of England and, it may be fairly stated, of the entire United Kingdom, is very depressed. There is little business doing to the Mediterranean and rates outward to the Baltic get worse instead of better. Freights in the coasting trade favour shippers, and there is little prospect of any improvement during the next three months except amongst small sailing vessels which will be needed to carry gas coals to the bye-ports, when the nights begin to lengthen. There is always a reaction in that direction about September.

The general manufacturing trade of the North was in a singularly depressed condition last week. There were few shipments of goods to the Continent; no fresh orders; and merchants and manufacturers take a very desponding view of the prospects of the autumn trade. The chemical market is very flat. Prices tended lower.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

As on former occasions, I devote my first "Note" this week to the annual meeting of the North British Association of Gas Managers, which was held at Stirling on Friday last. The meeting was in every way a marked success, whether we regard the attendance of members, the comprehensive and statesmanlike address of the president in opening the proceedings, or the interesting, instructive, and practical character of the papers that were read, and the discussions to which they gave rise. All parts of Scotland were well represented at the meeting, and even the North of England put in an appearance. A number of new ordinary and extraordinary members were elected. In their minutes, the council reported, regarding the competition for a prize of £10, offered by Mr. Andrew Stewart, of Glasgow, for the best paper on the question—"Is it possible to do without the aid of Gasholders in the Production and Supply of Coal Gas, and what Practical Means can be suggested to Serve the Same Purpose?" that there had been a competition, but not sufficient to justify the award of the prize. As this was the first occasion for the Aitken-Young process to be brought under the notice of the North British Association, it naturally became the subject on which the main interest of the meeting was concentrated, the discussion upon Mr. Mitchell's paper being very full, well sustained, and of much scientific and practical value. Mr. Whimster, of Perth, was very eloquent in praise of the scientific beauty of the process and the apparatus for carrying it out; at the same time he was very much concerned to know whether or not he would profit as much by extracting the volatile hydrocarbons from the tar in the "analyser," and adding them to the gas, as by selling them in the separate state. Other speakers were anxious to learn if there was not a fear, or even a certainty, that the naphtha vapours would condense during cold weather, and thereby greatly diminish the luminosity of the gas. Generally speaking, I think that most of the difficulties of the various doubters were met by Mr. Mitchell and Mr. Young, as also by Messrs. Stewart, of Greenock, and Monk, of Lanark, both of whom were engaged in testing the process very fully at Hamilton, on behalf of the West of Scotland Association of Gas Managers. Next year's meeting is to be held at St. Andrew's, and Mr. Hall, the manager of the gas-works in that ancient university town, is the president elect.

In my last report I was unable to overtake a notice of the annual meeting of the Kilmarnock Gas Corporation. The report upon the gas supply for the past year was most satisfactory. It stated that the amount of gas sold during the year ending June, 1877, was 37,727,100 cubic feet, or 1,588,450 cubic feet more than in the preceding year—the value of the gas sold in the two years being respectively £9034 13s. 2d. in 1876, and £9431 15s. 6d. during the past year. There has been an increase of 35 per cent. in the make of gas since the works came into the hands of the Town Council in June, 1872, or at the rate of nearly two million cubic feet per annum. The receipts from the chemical works, where the secondary products are treated, are still on the increase, the profits during the past year being £1222 18s. 5d., an amount equal to 5s. 2¾d. per ton of coal used in the gas-works. This is a most important feature of the Kilmarnock management, and it reflects the greatest credit upon the abilities of Mr. Dalziel, the manager. The illuminating power of the gas supplied to the consumers during the past year, or rather from September, 1876, to the end of April, 1877, ranged from 26 to 31 candles, the average being 28·4 candles. The Gas Committee have thought it prudent not to recommend any change in the price of the gas at the present time, and the Town Council have approved of the recommendation.

At the annual meeting of the Stewarton Gas Company, held last Thursday, it was agreed to pay a dividend of 15s. on the original £5 shares. Seeing that they had so much money at their fingers ends, Mr. Thomas Young recommended to the directors to reduce the price of gas. During the past year it was sold at the rate of 4s. 7d. per 1000 cubic feet.

The Barrhead Gas Company's annual report shows an increased make of gas amounting to 500,000 cubic feet, the average produce per ton of coal being 9800 cubic feet, the average price of coal being 17s. per ton, and the average illuminating power of the gas being 27 candles. The leakage of gas during the past year was reduced from 20 to 17 per cent. It was resolved to reduce the price of gas from 5s. 10d. to 5s. 5d. per 1000 cubic feet, and to supply the street-lamps free of charge; and also to present the manager, Mr. Fairweather, with the sum of £20, and to add a like sum to his salary, in consideration of the very satisfactory manner in which that gentleman has managed the affairs of the company since his appointment.

The directors of the Saltcoats Gas Company have declared a dividend of 10 per cent. out of the profits of the past year's transactions.

The business at the annual meeting of the Galashiels Gas Company gave rise to considerable discussion. On a former occasion I mentioned the leading features of the annual report, in which were embodied the recommendations of the directors, one of which was that a bonus of 2½ per cent. should be paid to the shareholders, in addition to the dividend of 10 per cent. It was eventually agreed that the bonus should not be issued, and that instead of increasing the share capital to meet the expense of the new piping now being laid, at a cost of £2200, the amount required should be taken out of the funds of the company.

A very favourable report was presented by the directors to the annual meeting of the Renton Gaslight Company. It showed the affairs of the company to be in a very prosperous condition. Since the works were erected, seventeen years ago, the value of the shares has been doubled, and the dividends have all along ranged from 7½ to 10 per cent. For the past year it was resolved to declare a dividend of 10 per cent., and to carry the sum of £115 17s. 2d. to the reserve-fund; and it was also resolved to reduce the price of gas from 5s. to 4s. 7d. per 1000 cubic feet.

At the last monthly meeting of the Rothesay Town Council, the Gas Committee reported that everything about the gas-works was in good order, and that the manufacture of gas was still decreasing, the make for June being 64,000 cubic feet less than for the corresponding period of last year.

A meeting of the Burgh Commissioners of Johnstone was held on Monday, the 9th inst., when it was reported that meetings of the Gas Committee had been held, and that satisfactory progress had been made in the negotiations for the acquisition of the gas-works, under the provisions of the Burghs Gas Supply (Scotland) Act. Several of the commissioners expressed themselves as being much pleased with the spirit in which the directors and shareholders of the gas company had met the commissioners in the matter.

On the same day, a meeting of the Police Commissioners of Linlithgow was held, when Mr. Watson, on behalf of a committee appointed some time ago to confer with the directors of the gas company, reported that the committee had met with the directors, who received them very courteously, but they declined to say at what rate they would be prepared to supply the town with gas until their yearly balance-sheet was made out. They would, however, give the gas at as cheap a rate as possible.

At a meeting of the Burgh Commissioners of Kirkintilloch, also held on the same day, the adoption of the Burghs Gas Supply Act was under consideration, but the Provost postponed his motion until a special meeting should be convened for the purpose.

A meeting of the Dundee Water Commission was held on Thursday, the 5th inst., when the accounts for the past year and the estimates for the present year were submitted. The revenue for the present year was estimated at £32,184 9s. 6d., of which it is expected that £14,750 will be derived from special rates. The domestic rate was fixed at 1s. 1d. per pound. The expenditure was estimated at £31,985, showing an apparent surplus of £199 9s. 6d. The gross charge for interest is £15,480, and it was proposed to debit £3460 of that to the suspense account, so that £12,020 of interest would be charged against revenue. It was calculated that within four years the whole of the suspense account would be wiped off. The accounts and estimates were approved.

Again I find my budget of news so full that a portion of it must be held over.

The pig iron market has been languid and drooping during the past week, with prices tending downwards. When the market closed on Thursday, the price was 51s. 2½d.

Prospects are not bright in the coal trade.

Glasgow Water Supply.—Dr. Mills, F.R.S., of the Andersonian University, Glasgow, reports that the water supplied to that city from Loch Katrine, in June, was very pale brown. The sample analyzed contained a decided amount of muddy particles and fibres, and an entomostracous insect visible to the eye. Iron traceable.

Farnworth and Kearsley Gas Company.—At the meeting of the Farnworth Local Board, on the 2nd inst., the following resolution, passed at a meeting of the directors of the Farnworth and Kearsley Gas Company, was read:—"That the directors have no authority from their shareholders to sell their undertaking, and are not prepared at the present time to enter into negotiations in reference thereto."

Embezzlement from the Cambridge Gas Company.—At the Cambridge Police Court, on Friday last, W. A. Coppin was charged, on remand, with embezzling certain moneys, the property of the Cambridge University and Town Gaslight Company, between the 26th of March and the 2nd of June of the present year. It was stated that the defalcations of the accused amounted in the whole to a very considerable sum. He was committed for trial at the ensuing assizes.

Reductions in the Price of Gas.—The Bury Town Council, at their meeting on the 5th inst., confirmed the minutes of the Gas Committee, reducing the initial price of gas from 4s. 2d. to 3s. 4d. per 1000 feet, with 5 per cent. for prompt payment, and an allowance of 1s. per 1000 feet as the gas consumer's share of the preceding year's profits. The Widnes Local Board have reduced their price for gas from 4s. to 3s. 6d. to large consumers, and from 4s. 6d. to 4s. to other classes of consumers.

Quality of the Newcastle-on-Tyne Gas.—Mr. John Pattinson reports as the results of his examinations, for the month of June, of the quality of the gas supplied to the borough by the Newcastle-upon-Tyne and Gateshead Gas Company:—

Date.	Illuminating Power in Sperm Candles.	Grains of Sulphur in 100 Cubic Feet of Gas.	Sulphuretted Hydrogen.
June 1	14·0	7·50	Nil.
„ 5	15·5	6·55	„
„ 8	15·6	6·35	„
„ 12	14·7	6·76	„
„ 15	14·8	6·10	„
„ 18	14·9	7·32	„
„ 22	15·1	8·12	„
„ 26	14·5	9·30	„
„ 29	15·6	9·81	„

A Sugg-Letheby standard Argand burner is used in testing. According to Act of Parliament, the gas should not be of less than 14 standard candles illuminating power, nor contain more than 17 grains of sulphur per 100 cubic feet of gas.

Production of Coal in Great Britain.—The quantity of coal raised from the mines of the United Kingdom reached 100 million tons in a year for the first time in 1866. In 1876 it amounted to 134,125,166 tons—namely, 115,334,359 tons in England and Wales, 18,665,612 tons in Scotland, and 125,195 tons in Ireland. Durham, our greatest coal-field, keeps its lead, its year's product now approaching 26 million tons. Wales, with Monmouthshire, shows a great recovery, and produced above

19 million tons in 1876. Nottinghamshire and Cumberland also present a substantial increase. Lancashire, Yorkshire, and Staffordshire show a considerable falling off as compared with the preceding year; and there is a noticeable decline also in Derbyshire, Northumberland, and Leicestershire.

SALES OF GAS AND WATER SHARES.—On the 26th ult. 50 £10 shares in the Worcester Gas Company were sold by auction, and realized £23 5s. per share. On the 4th inst. 16 one-thirtieths and 30 one-sixtieths of a moiety of a King's share in the New River Company, and also a number of new shares in the same concern, were disposed of at the Auction Mart, London. The sixtieths of a moiety of a King's share realized on an average rather more than £650 each; while the thirtieths sold for about £1300 each, or at the rate of £78,000 per share. On the same occasion two-sixtieths of an Adventurer's share sold for £1375 each, while one seventy-fifth realized £1100. Several £100 new shares, fully paid up, sold for £300 and £305 per share, while a large number of £100 new shares, £85 per share paid, realized prices ranging from £280 to £285 per share.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

2486.—WRIGHT, J., Tipton, Stafford, "Improvements applicable to steam-engines for heating and purifying water, and heating or cooling air in other fluids, and for condensing exhaust steam." June 27, 1877.

2488.—MARSHALL, F. D., Cambridge Street, London, "Improvements in the manufacture of gas, and in apparatus therefor." June 27, 1877.

2520.—HOPPER, G. C., Southampton Buildings, London, "Improvements in apparatus for lighting and extinguishing gas flames." A communication. June 30, 1877.

2524.—WIRTH, F., Frankfort-on-the Maine, Germany, "A new method of purifying water." A communication. June 30, 1877.

2545.—JOHNSON, E., Lewisham, London, and ROBEY, J., Manchester, "Improvements in the method of treating sewage sludge." July 3, 1877.

2546.—TONGUE, J. G., Southampton Buildings, London, "Improvements in holders for globes or shades for gaslights, and in gas-burner connexions." A communication. July 3, 1877.

2552.—LAKE, W. R., Southampton Buildings, London, "Improvements in apparatus for heating water by gas." A communication. (Complete specification.) July 3, 1877.

2583.—HENDERSON, G., and M'NEIL, D., Blackfriars Road, London, "Improvements in supplying, controlling, or regulating the flow of water or fluid." July 4, 1877.

2585.—PROSSER, W., Chelsea, and MOORE, W. E., Brixton Rise, London, "Improvements in the construction and arrangements of lamps or apparatus adapted to the electric light, parts of which are applicable to other lights." July 5, 1877.

2596.—MEWBURN, J. C., Fleet Street, London, "Improvements in apparatus for indicating, registering, and regulating the speed of engines and rotating shafts for measuring the flow of water or gas, and for other purposes." A communication. July 5, 1877.

2621.—SIMON, L., Nottingham, and MÜLLER, H. L., Birmingham, "Improvements in gas-engines." A communication. July 7, 1877.

2644.—HADDAN, F. W., Westminster, "An improved liquid or water-meter or water-power engine." A communication. July 10, 1877.

2646.—ASHWORTH, G. and E., Manchester, "Improvements in steam-pumps and pumping-engines." July 10, 1877.

2647.—MELLING, T., Aigburth, Lancs, "Improvements in water-meters or apparatus for measuring and registering the quantity of water or other fluid flowing through pipes or other conduits." July 10, 1877.

2659.—RENNICK, C., Queen Victoria Street, London, "Improved apparatus for lighting and extinguishing gas." A communication. July 10, 1877.

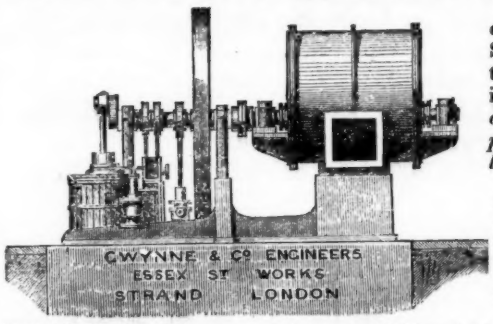
2664.—PAINE, W., Anerley, Surrey, "Improvements in liquid-meters." A communication. July 10, 1877.

2665.—WISE, W. L., Adelphi, London, "Improved apparatus for raising liquids." A communication. July 10, 1877.

2667.—AVERY, C., Islington, London, "Improvements in rotary engines and pumps." July 11, 1877.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

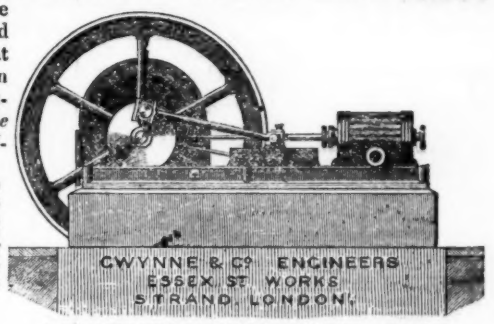
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure. Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

☞ *G. & Co. are now making 6 Sets Exhausters and Engines for 105,000 cubic feet per hour, 3 Sets 180,000 Exhausters and Engines, with many others of all Sizes.*

WANTED, small Gas-Works on Lease, for 7, 14, or 21 years. Annual make from two to six millions; a per centage upon capital to be paid as rent.

Advertiser is also open to purchase small gas-works.

Address No. 381, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Young Man who has served his apprenticeship to a Gas Engineer, a situation as MANAGER of a small Gas-Works, or to act as Assistant to the Engineer of a large Works; has had good practical experience, and can be strongly recommended.

Address No. 382, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS ENGINEERS.

WANTED, by a Provincial Gas Company, a thoroughly competent GAS ENGINEER to take the charge of a Gas-Works in the South of England, where the make of gas is about 140 million cubic feet per annum.

Applications, with particulars of present engagement, references, and amount of salary required, may be addressed in first instance to No. 383, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BOROUGH OF DEWSBURY.

APPOINTMENT OF GAS MANAGER.

WANTED, by the Corporation of Dewsbury, a person competent to perform the duties of MANAGER of their New Gas-Works, at a yearly salary of £200, together with a house at the gas-works rent free, and with coals and gas free.

The person employed will have to devote the whole of his time to the duties of his Office, and must have had practical experience in the manufacture and distribution of gas, and in the general management of large gas-works.

Applications, stating age, qualification, and present employment, together with testimonials of character and ability, to be sent to the Town-Clerk's Office, in Bond Street, Dewsbury, on or before Monday, the 30th day of July, 1877.

By order,
JESSE SMITH, Town-Clerk.

Town-Clerk's Office, Dewsbury, July 12, 1877.

WANTED, a steady Man to take charge of small Gas-Works. Wages 18s. per week. House, coal, and gas free.

Address No. 385, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Working Manager of a Gas-Work, a SITUATION. Can do main and service laying, meter-fixing, setting of retorts, clay or iron, on an improved principle, inside or outside fittings of any description. Good testimonials. Abroad preferred.

Address No. 386, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Advertiser will be glad to have the Address of any Firm or Company willing to erect Gas-Works abroad. An introduction to the principal men of the town, and all information, will be given.

Address No. 384, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE RATING OF GAS AND WATER WORKS.

A Gentleman of experience in the Rating of Properties of Public Companies is willing to undertake, in the interests of Companies, the Valuation of Gas and Water Works for Rating purposes.

Address, in first instance, No. 367, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Malvern Local Board require an ASSISTANT to the Surveyor and Gas Manager. Salary 35s. per week.

Full information respecting the duties may be obtained of the Surveyor and Gas Manager, Mr. J. E. Palmer, Local Board Office, Malvern.

Applications, with testimonials, to be sent to the undersigned on or before Monday, the 23rd day of July inst.

By order of the Board,
WM WILKES CAWLEY, Clerk.

Local Board Office, Malvern, July, 1877.

R. ANDREWS, Bricklayer and Retort-Setter, 114, Elsby Road East, Shaftesbury Park Estate, late of Broomfield Cottage, Southgate, N. Estimates given for all kinds of work connected with gas-works.

On Thursday next will be published, price 5s., by post 5s. 3d., cloth, 8vo., gilt lettered,

SULPHUR COMPOUNDS IN GAS.

A full Report of the Evidence given before the Select Committee of the House of Commons on the Bills of The Gaslight and Coke Company and the Crystal Palace District Gas Company in the present Session.

As the number of Copies printed is very limited, early application to the Publisher is necessary, to prevent disappointment.

LONDON:
WILLIAM B KING, 11, BOLT COURT, FLEET ST.

GAS-WORKS TO LET.

TENDERS are invited for a Lease of the Lampeter Gas-Works for a term of years.

Particulars may be obtained on application to Mr. DAVID LLOYD, Solicitor, LAMPETER.

BERWICK AND TWEEDMOUTH GASLIGHT COMPANY.

FOR SALE, as they now stand at the Works, Spittal, Four GAS-PURIFIERS, 6 ft. by 4 ft. 1 in. and 3 ft. deep, in excellent working order, with connexions and sieves complete.

Apply to the SECRETARY, Berwick.

GASHOLDER FOR SALE.

ONE Telescopic Gasholder, 70 feet by 20 feet, complete, with cast-iron tank, columns, girders, and inlet and outlet pipes, valves, &c., of modern construction. In first-class condition, and made by Messrs. Piggott and Co., of Birmingham.

To be seen at work at the Gas-Works, Birkenhead.

Cause of removal to make room for extensions.

To be sold a bargain, taken down, and re-erected ready for work.

For particulars, apply to Messrs. ASHMORE AND WHILE, STOCKTON-ON-TEES, or to view to Mr. CALLOW, Gas Engineer, BIRKENHEAD.

FOR SALE—A Set of Four Purifiers, 8 ft. by 6 ft., with covers, grids, centre-valve, and 6-in. connexions complete.
Apply to J. GILL, Gas-Works, BRIDGNORTH.

FOR SALE—A Patent Purifier and Valve-Box, with 4-in. connexions, suitable for a small Gas-Works. Enlargement of works has rendered above unnecessary.
Apply to the SECRETARY of the Kirkby Stephen Gas-Works, WESTMORELAND.

FOR SALE—One Exhauster by Jones, of Birmingham, capacity 25,000 feet per hour, with by-pass, 12-in. inlet and outlet pipes and valves complete, in first-class working condition, price £40; also one Exhauster Regulator, with chain and weights complete, price £5.
Apply to CLAPHAM BROS., Ironfounders, &c., Keighley, YORKS.

EXHAUSTERS FOR SALE.

TWO of Laidlaw's Patent Exhausters supplied by the Makers to pass 80,000 cubic feet per hour each; have been used only two months. Will be SOLD, together or separately, at half the original cost, or £100 each.
Apply to the ENGINEER, Crystal Palace District Gas Company, LOWER SYDENHAM, S.E.

MACCLESFIELD CORPORATION GAS-WORKS.

STATION-METER.

THE Gas Committee have for Sale a STATION-METER in good condition, by Thomas Edge; capacity 12,000 feet per hour.
THOMAS MOORE, Manager.
July 9, 1877.

TO TAR DISTILLERS.

THE Directors of the Dover Gaslight Company are prepared to receive TENDERS for the purchase of the TAR produced at the Gas-Works, Dover.
Tenders to be sent in before Saturday, the 21st of July inst.
For information as to terms and conditions, apply to the undersigned.
R. H. JONES, General Manager.
Dover, July 2, 1877.

TO IRONFOUNDERS AND OTHERS.

THE Directors of the Berwick and Tweed- mouth Gaslight Company are prepared to receive TENDERS for the supplying and fixing at their Works, Spittal, of Two GAS-PURIFIERS.
Plans and specifications may be seen on application to the Manager at the Works, and tenders are requested to be lodged with the undersigned on or before the 25th inst.
The Directors do not bind themselves to accept the lowest or any tender.
By order,
J. WIGHT, Secretary.
Ravensdowne, Berwick-on-Tweed, July 14, 1877.

TO COAL PROPRIETORS.

THE Gas Committee of the Corporation of Warrington are prepared to receive TENDERS for the supply of the best quality of Coal and Cannel for One, Two, or Three years, from the 1st day of August next.
Particulars as to quantity and conditions of contract may be obtained on application to the undersigned, to whom sealed tenders, endorsed on the outside "Tender for Coal," must be sent in, on or before Thursday, the 19th inst.
JAMES PATERSON, Manager.
Gas-Works, Warrington, July 7, 1877.

TO TAR DISTILLERS, &c.

THE Directors of the Ashford (Kent) Gas and Coke Company are prepared to receive TENDERS for the surplus TAR produced at their Works, for One, Two, or Three years. Quantity about 10,000 gallons per annum.
Tenders to be at per cask (36 gallons), loaded on Company's siding at Works.
Tenders to be sent to F. H. Hallett, Esq., Secretary, on or before the 4th of August, endorsed "Tender for Tar."
The Company do not pledge themselves to accept the highest or any tender.
Further particulars may be obtained at the Company's Works from the Manager.
By order,
F. H. HALLETT, Secretary.
Ashford, July 13, 1877.

SALFORD CORPORATION GAS-WORKS.

THE Corporation of Salford invite Ten- DERS for the supply of CANNEL and COAL required at the various Gas Stations in Salford, for One, Two, or Three years, commencing on the 1st day of September next.
Forms of tender (upon which only tenders will be received), and all particulars, may be obtained on application to the Engineer, Mr. Samuel Hunter, Gas-Works, Lamb Lane, Salford.
Tenders, endorsed "Cannel and Coal Contract," to be delivered to me on or before the 28th inst.
The Corporation do not bind themselves to accept the lowest or any tender.
By order,
CHRIS. MOORHOUSE, Town-Clerk.
Town Hall, Salford, July 11, 1877.

Now ready, price One Shilling, No. 8 (to be continued Monthly) of

A TREATISE ON THE SCIENCE & PRACTICE
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Manufacture and Distribution
OF
COAL GAS.

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Now ready.

THE GAS & WATER COMPANIES DIRECTORY
FOR THE YEAR 1877,
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8, BUCKINGHAM STREET, ADELPHI, LONDON, W.C.
THIS WORK IS UNDER THE PATRONAGE OF ALL THE LEADING GAS & WATER ENGINEERS AND SECRETARIES OF THE METROPOLITAN & PROVINCIAL COMPANIES.
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SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF
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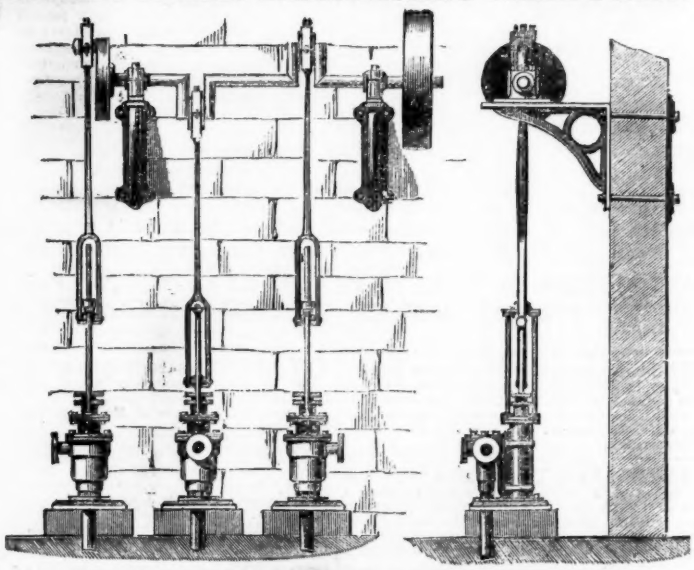

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For Water. For Tar. For Ammoniacal Liquor.

This illustration shows an arrangement of three (No. 179) Improved Double-Action Pumps driven from the same crank-shaft, as frequently supplied for use in Gas and Chemical Works. The suction and discharge pipes can be arranged for drawing from and delivering in any required direction.

These Pumps have been supplied to nearly all the large Gas Companies and Chemical Works, both for Pumping Water, Tar, and Ammoniacal Liquor.

GAS SYPHON PUMPS, IN COPPER OR SHEET IRON, ALWAYS IN STOCK.
Illustrated Catalogues sent post free on application.

NOTICE OF REMOVAL.
D. BRUCE PEEBLES & CO.
Beg to announce that they have REMOVED to their New Premises,
TAY WORKS, BONNINGTON, EDINBURGH,
To which all communications should now be addressed.
May 30, 1877.

Just Published, price 10s. 6d.,

AN ANALYSIS OF THE

METROPOLITAN GAS COMPANIES ACCOUNTS

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(In continuation of the Seven previous Years, 1869–1875,)

COMPILED AND ARRANGED BY JOHN FIELD,

MANY YEARS ACCOUNTANT TO THE LATE IMPERIAL GAS COMPANY.

By the same Author,

A COMPARATIVE AVERAGE ACCOUNT BOOK,

FOR THE ENTRY OF GAS COMPANIES ACCOUNTS FOR SERIES OF YEARS.

Price, for Half Yearly and Yearly Comparison, Foolscap Size, 21s.; Quarto, 12s. 6d.; for Yearly Comparison only, 8s. 6d.

To be had of W. B. KING, "Journal of Gas Lighting," 11, BOLT COURT, FLEET STREET, E.C.;

OR OF

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GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

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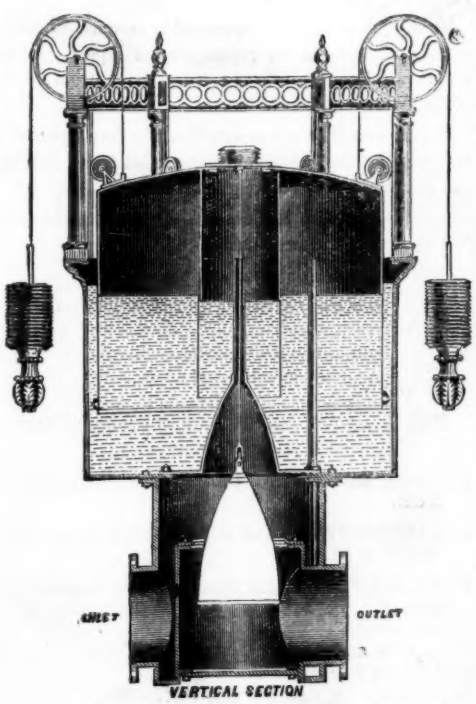
GLOBE METER-WORKS,

OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

CITY OF HEREFORD.

TENDERS FOR CANNEL.

THE Gas Management Committee of the Corporation invite TENDERS for the supply of 150 Tons of the best quality of CANNEL, to be delivered free at the Corporation siding, Barrs Court, Hereford, during the month of November next.

Tenders, with particulars of analysis and description of Cannel, to be sent to the undersigned, endorsed "Tender for Cannel," on or before the 6th day of August next.

The Committee do not bind themselves to accept the lowest or any tender.

WILLIAM DAVIS, Engineer and Manager.

Gas Office, Hereford, July 12, 1877.

BOROUGH OF WIGAN.

TENDERS FOR GAS MAINS.

THE Gas Committee of the Corporation are prepared to receive TENDERS for the supply of the following PIPES—viz., 2000 yards of 4-inch and 1500 yards of 3-in. The same to be coated with Dr. Angus Smith's patent preparation, and delivered free at the Gas-Works, Chapel Lane, Wigan.

Also Two Tons of SOFT PIG LEAD, and One Ton of COMPOSITION PIPE assorted.

Further particulars can be obtained from Mr. J. G. Hawkins, the Engineer, to whom sealed tenders must be sent not later than the 17th inst., endorsed "Tender for Gas-Mains."

The lowest tender not necessarily accepted.

MASKELL W. PEACE, Town-Clerk.

July 6, 1877.

BOROUGH OF ROTHERHAM.

TENDERS FOR GAS COAL.

THE Rotherham Corporation invite TENDERS for the delivery at Rotherham, in monthly quantities from the 1st of September next, of from 6000 to 8000 Tons of best GAS COAL.

The Coal to be 21 cwt. to the ton, well screened, to contain sparingly of sulphur, and be as free as possible from smudge, shale, bats, bind, or any other impurity.

Further particulars and monthly quantities can be obtained on application to the Manager, Gas-Works, Rotherham, or at the Gas Offices of the Corporation.

Tenders to be sent in to me, endorsed "Tender for Gas Coal," on or before the 21st of July inst.

The Corporation do not bind themselves to accept the lowest or any tender.

By order,

W. WHITFIELD, Town-Clerk.

Corporation Offices, Rotherham, July 6, 1877.

NOTICE.

MESSRS. THOMAS DOCWRA & SON, Contractors, Balls Pond Road, hereby give notice that they have no business connexion with any other person of the same name.

TO GAS COMPANIES.

WE beg to call attention to our special STEATITE BURNERS for Street Lamps. Sample gross 8s. Quotations for quantities.

Messrs. TINDALL AND TELLING, Gas Apparatus Works, 74, Wynford Road, Penton Street, LONDON, N.

PAMPHLET ON GAS.

COOKING AND HEATING.

HINTS ON GAS-BURNERS, &c.

For GAS COMPANIES to distribute to their Gas Consumers.

Specimen Copy by post Threepence, from the Author,

MAGNUS OHREN, Gas-Works, Sydenham, S.E.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

HENRY LYON,

ENGINEER,

AND

CONSULTING GAS ENGINEER,

BARTON HOUSE, opposite BARTON ARCADE, DEANSGATE, MANCHESTER.

ALFRED LASS,

SPECIAL ACCOUNTANT FOR GAS COMPANIES,

30, GRACECHURCH STREET, LONDON.

Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.

The above forms are registered.

Water Companies Accounts also prepared and adjusted.

CONSULTATIONS.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

JOHN ROMANS, C.E., F.G.S.E.,
CONSULTING GAS ENGINEER
AND
CANNEL COAL FACTOR,
30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

PATRONIZED BY THE ROYAL ARSENAL, WOOLWICH.

FERGUSON, Builder and Contractor. Kite method of Repairing Church Spires and High Chimneys. Chimneys straightened, pointed, and hooped. Old Chimneys pulled down by a process requiring no scaffolding or stoppage of work, by competent workmen, under personal supervision. For Lightning Conductors—cheapness and method of fixing—apply to C. R. FERGUSON, 12, Canal Road, MILE END.

PATENT FUEL AND LIME FOR PURIFYING FROM FOUL LIME.

By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

Licences to work the invention will be granted to Gas Companies on very reasonable terms.

For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.

The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

BOUCK & CO., LIMITED,
TAR DISTILLERS & MANUFACTURING CHEMISTS,
MILES PLATTING, MANCHESTER.

BUYERS OF COAL TAR,
And Crude Products therefrom,
AMMONIACAL LIQUOR, &c.

HEBBURN MAIN GAS COALS.

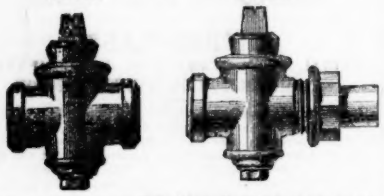
T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

THE TYNE COAL COMPANY, LIMITED, OWNERS.
W. RICHARDSON, Fitter,
29, QUAYSIDE, NEWCASTLE-ON-TYNE.

LAMBERT'S
CAST-IRON GAS-MAIN COCKS,
WITH PATENT WHITE METAL PLUGS.

TRADE (L) MARK.

No. 758. No. 759.



The bodies of these Taps are made of iron, black or galvanized, and the plugs of patent metal. They are warranted not to set fast or corrode, as do Iron or Brass Cocks; will always work easily; are strong, well made, durable; of little or no intrinsic value, and therefore not likely to be stolen; and the prices as stated below are (especially upon the larger sizes) fully 50 per cent. less than Brass Cocks.

	½	¾	1	1¼	1½	2-inch.
No. 758, with inside screws for iron pipe, black	2/0	3/0	4/4	6/6	7/6	12/0 each.
No. 759, with union on one end screwed inside for iron pipe, black	2/9	3/10	5/4	8/0	9/0	15/6 each.
Nos. 758 and 759, galvanized	0/3	0/4	0/6	0/8	0/10	1/4 extra.

MANUFACTORY:
SHORT STREET, LAMBETH, LONDON.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

LIVERPOOL MEETING.

INTERNATIONAL EXHIBITIONS.
London, 1851.
London, 1862
Paris (class 53) 1867
Paris (class 63) 1867
Naples, 1871.
Trieste, 1871.
Moscow (gold) 1872.
Moscow (silver) 1872
Brussels (silver) 1876

PRIZE MEDALS.

AGRICULTURAL SHOWS.
Manchester and Liverpool, 1867.
Royal, 1869.
Royal, 1870.
Manchester and Liverpool, 1871.
Ayrshire, 1876.
Highland Society, 1876.

Gold Medal of the Society for the Promotion of Scientific Industry, Manchester, 1875.

HENRY POOLEY & SON

Invite attention to their

STAND No. 212 (Opposite the MEMBERS' CLUB),

Where they are exhibiting a large variety of their

PATENT WEIGHING APPARATUS,

Suitable for

Agricultural, Railway, Manufacturing, and Commercial Purposes.

WORKS AND CHIEF OFFICES—

ALBION FOUNDRY, LIVERPOOL.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

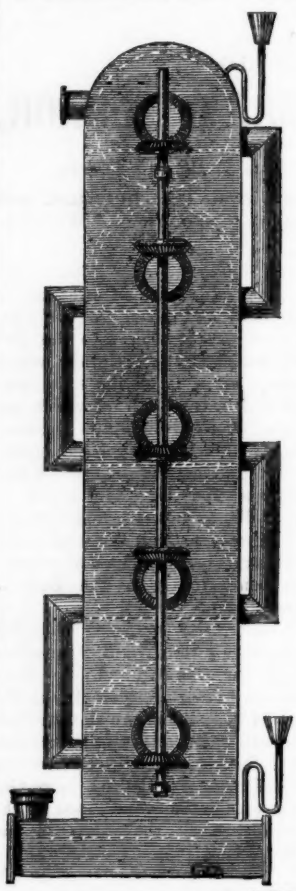
35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.

ANDERSON'S

PATENT

COMBINED WASHER AND SCRUBBER.



TESTIMONY OF ITS ACTION.

The Gas-Works, St. Albans,
April 27, 1877.

DEAR SIR,

Your Brush Scrubber has been in action here for four months.

It removes the whole of the ammonia from the gas, so that it will not discolour moistened turmeric paper.

The brushes cause no appreciable increase of pressure, and there is no repumping of liquor. Clear water run in at top, issues from the bottom fit to proceed to the sulphate-house.

It performs its work more efficiently than the tower scrubber I have, while only about half the height, and not one-fourth its weight or capacity.

My purifiers also last much longer before they are foul than they did previously.

I am, yours truly,
A. F. PHILLIPS.

G. Anderson, Esq.,
35*a*, Great George Street, S.W.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the CONSTRUCTION of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

GAS PURIFICATION.

BAILES & HALLSWORTH,

CONTRACTORS FOR THE

PURIFICATION OF COAL GAS,

BY THEIR

PATENT OXIDE OF IRON COMPOUND.

The material is in use at most of the principal Gas-Works in Yorkshire and elsewhere. It contains considerably less moisture than natural Oxide of Iron. It is much cheaper and more efficient as a purifying agent.

B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.

FOR SAMPLES AND TERMS, ADDRESS—

BAILES & HALLSWORTH, COPPERAS WORKS, ARMLEY, LEEDS.

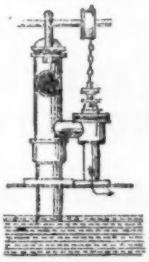
ADDISON POTTER,

WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of
CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

THOMAS CARR & SON,

MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS, &c., &c.,
SCOTSWOOD FIRE-BRICK WORKS,
SCOTSWOOD-ON-TYNE.

COPP'S PATENT ANTI-DIP GAS APPARATUS.



Produces from 10 to 20 per cent. more gas of higher illuminating power.
Prevents the deposit of carbon.
Retorts last much longer.
Charges work off quicker.
This simple invention has been in use in many works for the last six months, with the above results.

PRICE 2 GUINEAS EACH.

Testimonials and particulars on application.

Address WALTER L. COPP, WATCHET, SOMERSET.

THE WIGAN COAL & IRON COMPANY,

LIMITED.

DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD,

MANUFACTURERS OF

IMPROVED CENTRE-VALVES,

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

IMPROVED
COMPENSATING GAS-METER.
HUNT'S PATENT.

This Meter supplies a want long felt, by putting an end to the loss sustained by Gas Companies through the overworking of their Meters.

COPIES OF REPORTS SENT ON APPLICATION.

MANUFACTURED BY

JOHN BENT & SON,

WET AND DRY GAS-METER AND GAS APPARATUS MANUFACTURERS,

BELL BARN ROAD, BIRMINGHAM.

Established 1830.

THE FARNLEY IRON COMPANY, LIMITED,

FARNLEY, near LEEDS,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS & FIRE-BRICKS,

Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

London Agent for Gas-Retorts: D. W. OGG, 3, Jeffrey's Square, St. Mary's Axe, E.C.

" " Glazed Bricks: A. BARFIELD, 22, Great George Street, Westminster.

LIVESEY FIRE-CLAY WORKS.

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS, LIMITED,

MANUFACTURERS OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS

GEORGE WALLER & CO.,

GAS ENGINEERS AND CONTRACTORS,

MANUFACTURERS OF

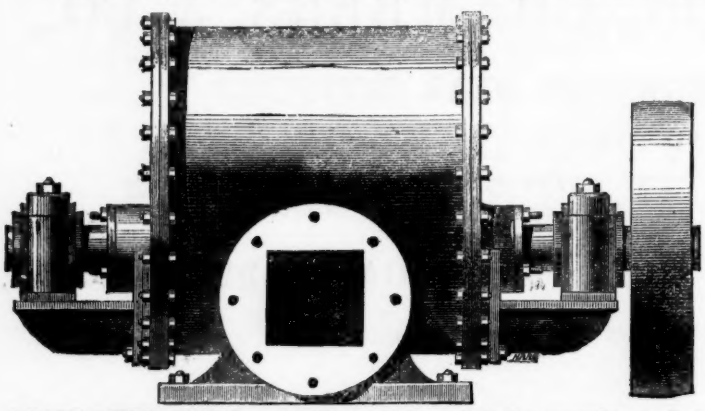
BEALE'S IMPROVED PATENT GAS EXHAUSTERS,

COMBINED ENGINES AND EXHAUSTERS,

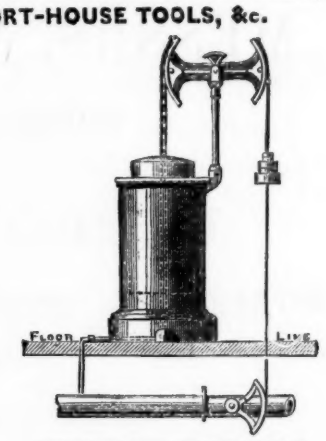
IMPROVED HYDRAULIC REGULATORS, TAR AND LIQUOR PUMPS,

SCRUBBERS, PURIFIERS AND CONDENSERS, HYDRAULIC AND STEAM LIFTS FOR COAL AND OXIDE,

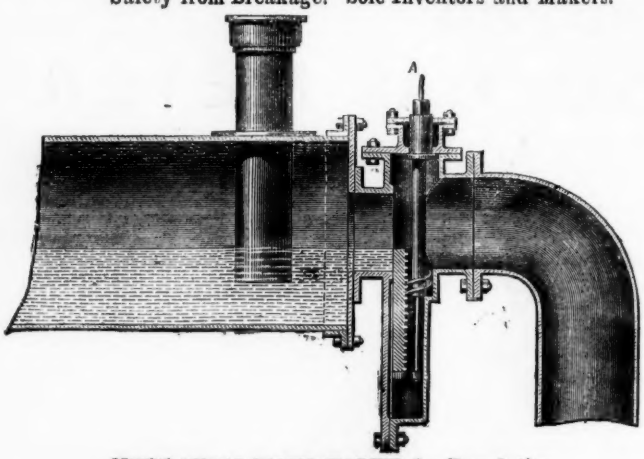
BOILERS, ROOFS, COLUMNS, GIRDERS, PURIFIER TRAVELLERS, RETORT-HOUSE TOOLS, &c.



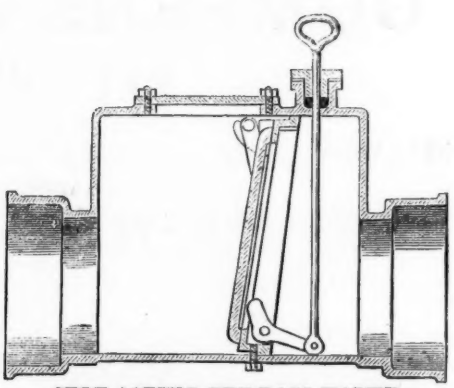
BEALE'S EXHAUSTER, with Wrought-Iron Spindle, ensuring perfect Safety from Breakage. Sole Inventors and Makers.



HYDRAULIC REGULATOR.



HYDRAULIC MAIN VALVE for Regulating Seal of Dip-Pipes.



SELF-ACTING BYE-PASS VALVE, with Relieving Lever.

EXHAUSTERS, VALVES, PUMPS, ENGINES, &c., ALWAYS KEPT IN STOCK.

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, SOUTHWARK, S.E.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL,
SAMUEL H. JOHNSON, } Joint Managing Directors.

HENRY GREENE & SON,

GAS AND HOT WATER ENGINEERS,

155, CANNON STREET, E.C.

Manufactory: 19 & 20, NICHOLAS LANE, E.C.

SUN-BURNERS,

With Regulating Valves to obviate down draught.

MEDIÆVAL & OTHER GAS-FITTINGS

For Churches and Domestic Use.

ARCHITECTS' OWN DESIGNS WORKED OUT.

ESTIMATES FREE OF CHARGE.

THE TRADE SUPPLIED.

SOLE CONSIGNEES FOR BRÖNNER'S IMPROVEMENTS IN GAS LIGHTING.

IN THE MATTER OF

BRÖNNER'S GAS-BURNERS.

HENRY GREENE AND SON, 155, Cannon Street, London, Sole Agents for Great Britain, Ireland, and Colonies, of Brönner's Improvements in Gas Lighting, beg to inform the public that on the 13th of January, 1876, Julius Brönner obtained an injunction in the Court of Session, Scotland, against Donald M'Vean, Gas-Fitter, 14, Newton Street, Glasgow, prohibiting him from in any way advertising or offering for sale as Brönner's Burners, any Burner not manufactured by Julius Brönner, or from in any way inducing the public to believe that the said Donald M'Vean sells or keeps for sale Brönner's Burners, manufactured by Julius Brönner, while such is not the case.

Also that on the 9th of November, 1875, he obtained injunction in the same Court, and in the same terms, against R. M. Brechin and Co., 46, North Hanover Street, Edinburgh.

Also that on the 20th of April, 1875, in a suit in Chancery, before Vice-Chancellor Malins, number 1874, B 365, he obtained injunction against another defendant, in the same terms and on similar grounds.

WEST'S GAS IMPROVEMENT COMPANY, LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

EDWARD COCKEY & SONS,

GAS ENGINEERS, FROME SELWOOD,

MANUFACTURERS OF ALL DESCRIPTIONS OF

APPARATUS CONNECTED WITH GAS-WORKS.

THE ORIGINAL PATENTEES AND MANUFACTURERS OF THE

DRY-FACED VALVES

FOR PURIFIERS, GASHOLDERS, BYE-PASS, AND OTHER ARRANGEMENTS REQUIRING VALVES IN GAS-WORKS.

The Faced Valves, as made by the Patentees, continue to give great satisfaction, and they are being used extensively by many of the best gas engineers of the day.

They are more easily repaired than any other kind of Valve in use, and can be re-ground in a few hours without removal, and made perfectly gas-tight.

References can be given to many Engineers of high standing, who will testify as to the favour in which they are held.

MANUFACTURERS ALSO OF SUPERIOR WOOD GRIDS FOR PURIFIERS, SCRUBBERS, &c.

THE

"LANCASHIRE" GAS-METER COMPANY,

LIMITED,

FALCON METER WORKS, ASHTON ROAD, OLDHAM.

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES.

LICENSEES AND MANUFACTURERS OF THE

IMPROVED

COMPENSATING GAS-METER.

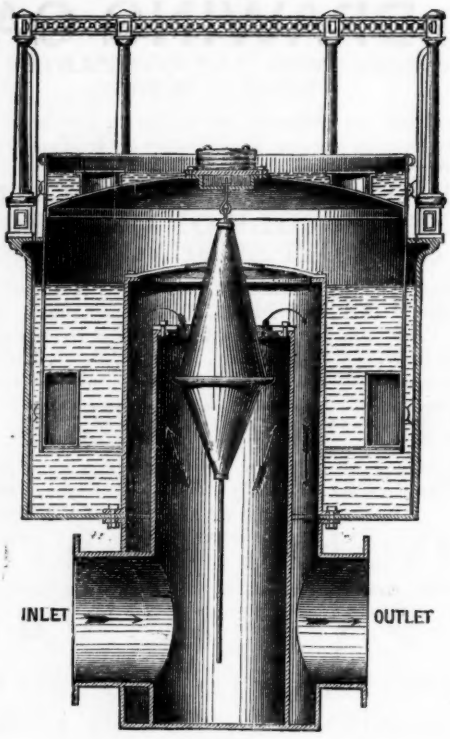
"HUNT'S PATENT."

"Its measuring powers may be relied upon as being most uniform under extremely varying conditions, both of pressure and rate of consumption per hour."—*Mr. Henry Sporne, City of London Meter Inspector.*

ALSO

THOMAS'S IMPROVED GAS GOVERNOR.

There is an arrangement in these Governors by which the not unfrequent collapsing of the Air Vessel is most effectually prevented.



SECTION

We supply these Governors, fitted either with Wheel and Counterbalance Weights, or with an Air Vessel, and arranged for water pressure, as shown in wood cut.

SIZES, 2-in. to 36-in. MAIN.

PRICES ON APPLICATION.

STATION-METERS, LAMP-METERS, GIROUD'S RHEOMETERS, &c., &c.

N.B.—This Company guarantees that the Workmanship and Materials in their Meters and Apparatus are of the very best quality.

HENRY THOMAS, Managing Director.

J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

LINCOLN.

LONDON OFFICES: 1, WESTMINSTER CHAMBERS, S.W.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—All Communications to be addressed to the FIRM ONLY.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GURST AND CHRIMES, ROTHERHAM.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

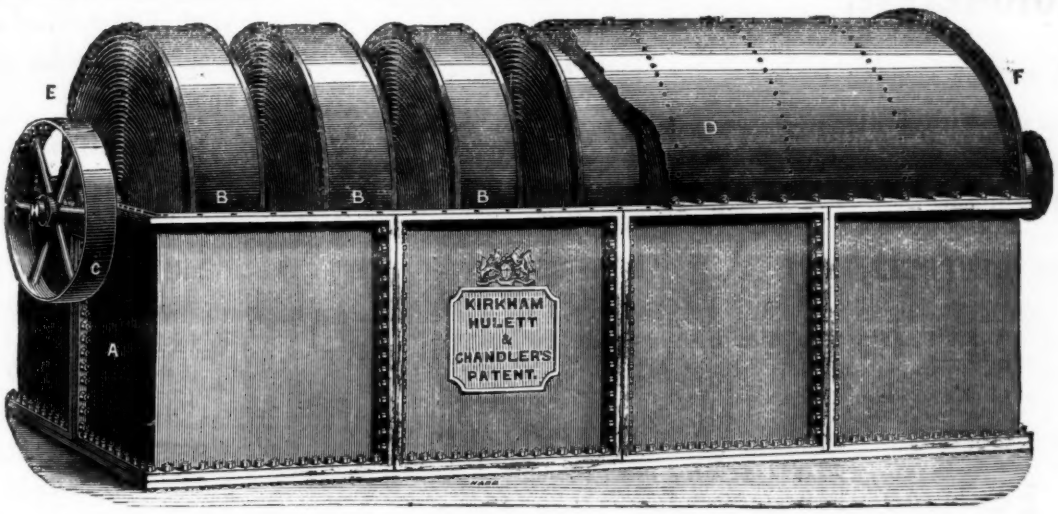
For prices, &c., apply to the Manufacturers, Messrs. GURST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

CATHELS'S Improved Retort-Settings. Guaranteed to heat and wear well, with great economy of Fuel.

Coloured lithograph copies of Working Drawings of Beds of One to Seven Retorts (so clearly arranged and fully shown as to be easily understood by any retort setter or bricklayer) having been made of these valuable settings, they can now be supplied with detailed Specification immediately on receipt of orders.

Apply to Mr. THOS. NEWBIGGING, Consulting Gas Engineer, 5, Norfolk Street, MANCHESTER.

STANDARD WASHER AND SCRUBBER.



The advantages of the Apparatus will doubtless be understood by those interested in gas manufacture.

The principal points of any Apparatus for the extraction of ammonia may be summarily stated as follows:—

1. **A large amount of Surface is desirable.**
2. **Such Surface should be always effectually Wetted.**
3. **The Surfaces or Scrubbing Material should cause no Pressure.**
4. **The Gas should meet various strength Liquors on its course.**
5. **However small the quantity of Water used, it ought to operate over the whole surface.**
6. **Changing Scrubbing Material is both Objectionable and Expensive.**
7. **Economy both as to Space occupied and Cost of Apparatus is an important item.**

All these requisitions are supplied by the above Apparatus, of which the following is an explanation:—

A is a cast-iron tank, formed into several separate water-tight compartments.

B B B volutes of sheet iron fitted to the centre shaft, which is driven by the pulley, C, and causing the said volutes to revolve each in a separate compartment filled with water or other fluid.

D, the cover, has partitions fitted into it corresponding with those in the tank, sufficient space being left between the top of the partition in the tank and the lower edge of that in the cover, to allow the gas a free passage through the first volute to the second, and so on to the third, fourth, &c.

The action is as follows:—The crude gas entering at E is partly washed in the first compartment, which becomes 10 or 12 oz. liquor, or stronger if required, according to the quantity allowed to enter per ton; the gas then passes to the second, where the liquor is of a less strength; thence into a weaker liquor, as it passes from one compartment to the other, finishing at the last compartment or outlet, F, with clean water, which is constantly flowing and running over from one compartment to another, until it reaches the last space, from which it flows from the outlet-pipe into the well or tank ready for sale or removal.

Taps are inserted in each compartment for the convenience of drawing liquor for testing, &c.

Applications as to Cost, &c., may be obtained of either

Mr. D. HULETT, 55 & 56, HIGH HOLBORN;

Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER;

Or Messrs. CHANDLER, 104, NEWINGTON CAUSEWAY.

Inquirers will please state their Maximum Day Make.

WILLIAM SUGG,

GAS ENGINEER,

VINCENT WORKS, VINCENT STREET,

WESTMINSTER, S.W.

"EVANS"

PHOTOMETERS,

Which DO NOT REQUIRE A DARK ROOM, with Fittings and Bench complete, as approved by the

GAS REFEREES.

LOWE'S

Jet Photometers

(KIRKHAM & SUGG'S IMPROVED),

With all the most recent additions.

"LETHEBY"

PHOTOMETERS,

With Fittings and Bench complete for DARK ROOM, as approved by the

GAS REFEREES.

THE "LONDON"

Standard Burner,

"GAS REFEREES MODEL,"

For 14 and 16 candle Gas.

"GAS REFEREES"

PRESSURE-GAUGES.

"GAS REFEREES"

SULPHUR & AMMONIA TESTS,

With all the accessories.

WILLIAM SUGG'S

PATENT

ILLUMINATING POWER METER,

For showing the Illuminating Power of Gas in Parliamentary Sperm Candles, by the observation of one minute.

PRICE £26 10s. COMPLETE.

The above Meter is now in use in London and several large towns in England, Scotland, and Ireland; also in America and Australia. The results, as reported to the present time, have given great satisfaction.

Price Lists and further Information on application to above Address.

JOHN ABBOT AND CO.,

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FOR

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IMPROVED HYDRAULIC MACHINERY,

Specially Arranged for Lifting and Lowering Purifier-Covers, &c.

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PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS;

PIPES FOR GAS AND WATER WORKS;

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DESIGNS AND ESTIMATES SUPPLIED ON APPLICATION.

THOMAS ALLAN & SONS,

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SPRINGBANK FOUNDRY & NORTH WOODSIDE FOUNDRY,

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CAST-IRON GAS AND WATER PIPES.

SIZES: ¾ to 12 inches at GLASGOW.

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A LARGE STOCK KEPT, AND PRICES MODERATE.

Freight to London, in the Stream, 10s. per ton from Stockton; 12s. 6d. from Glasgow.

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MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. and W. Walker, 8, Finsbury Circus, London, E.C., or to Mr. William Mann, late Superintendent of the Chartered Gas-Works, Blackfriars, London; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

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MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

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WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

TO GAS COMPANIES AND THE TRADE.

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IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,

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STREET LAMPS AND COLUMNS IN GREAT VARIETY.

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GAS MOONS,
Cut and Engraved, of the newest designs

GAS REFLECTORS
In Silver and Glass

GAS NIBS
AND
BURNERS
Of every description.

Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1876, are now complete.

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ESTABLISHED 1830.

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FERRAND DAVIES,

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SOLE AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

Quotation and Analysis forwarded on application.

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GAS COAL AND CANNEL FACTOR,

Has on offer, in quantities to suit purchasers, Best Wigan Arley Mine, Orrell Screened and Unscreened Gas Coal and Nuts; Best Yorkshire, Real Old Silkstone, Derbyshire, and North Staffordshire Screened and Unscreened Gas Coal and Nuts; also Best Lancashire, Yorkshire, Derbyshire, and other Cannel, as supplied to some of the principal Gas Companies in England, to whom references are permitted.

Analysis and Prices forwarded on application to

HEAD OFFICES, STOURBRIDGE.

N.B.—Gas Managers will oblige by advising when they will be prepared to receive Tenders.

STOURBRIDGE FIRE-BRICKS, RETORTS, CLAY, &c.

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SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

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Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

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The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

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Established 1840.

WILSON CARTER & PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or export Best Wigan Arley Gas Coal and Nuts; best qualities of the Derbyshire, Yorkshire, and North Staffordshire Gas Coals and Nuts; also the best descriptions of Lancashire, Welsh, Scotch, and other Cannel.

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PORTABLE PIPE SCREWING

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For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great satisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

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ALBERT GAS COAL.

THE DERBYSHIRE

SILKSTONE COAL COMPANY,

LIMITED,

CAN OFFER A

GAS COAL

Of superior quality, delivered in trucks at any Railway Station in England, or shipped on board at Hull, Grimsby Docks, or Barrow-in-Furness.

Purified gas per ton of coal in cubic feet (average)	10,262
Illuminating power in candles	15·86
Weight of coke in lbs. per ton of coal	1,502

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Mr. EDMUND TAYLOR, Secretary,

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THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

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REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces 12,240 cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

THE

WIGAN & WHISTON COAL COMPANY,

LIMITED,

(COLLIERIES—PRESCOT, NEAR LIVERPOOL)

Are now prepared to supply their

RUSHY PARK GAS COAL,

Either to Gas-Works in England or Wales, or for Shipment, at Runcorn, Garston, Birkenhead, or Liverpool.

This Coal is of superior quality, and yields in practical working over 10,000 cubic feet of Purified Gas per ton, with an Illuminating Power of 17½ candles.

One Ton of Coal yields 1441 lbs. of good Coke.

For prices, &c., apply either direct to the Colliery or to the Company's Office,

195, FALKNER STREET, LIVERPOOL.

SILKSTONE GAS COAL

AND

LANCASHIRE AND MIDLAND CANNEL.

EMOR G. WRIGLEY, Merchant,

Having made arrangements with four large Collieries for the exclusive sale of their GAS COAL and CANNEL, can offer to Gas Companies large quantities, for delivery over one or two years, at exceedingly low prices. His REAL OLD SILKSTONE GAS COAL will give, in regular work, 10,200 feet 16·6 candle gas and 13 cwt. superior coke; and a WIGAN CANNEL 11,375 feet 21·75 candle gas and 12 cwt. superior coke.

PRICES AND ANALYSIS WILL BE FORWARDED TO ANY PART ON APPLICATION TO THE CHIEF OFFICE,

120a, STAMFORD STREET, ASHTON-UNDER-LYNE.

1862.

PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

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CLASS II.

This Paint having been in general use over fifteen years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

The following Gas Companies in London have used the Paint for years—viz., The Gaslight and Coke, Imperial, Independent, City of London, Commercial, London, and Surrey Consumers.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

SPECIAL DRIERS FOR ANTIMONY PAINT SUPPLIED.

NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

Warrington Gaslight and Coke Company,
Offices, Mersey Street, Warrington, April 23, 1877.

Messrs. NEWTON, CHAMBERS, AND CO.,

Gentlemen,

After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

The average of Nine samples gives a yield of 12,500 cubic feet of 15½ Candle Gas, being equivalent to 664 lbs. of sperm per ton, and 1420 lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

Yours truly,

JAMES PATERSON.

Full particulars will be sent on application to us—address as above.

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DRY GAS-METERS,

PRIZE MEDALS.
LONDON, 1851;
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(INVENTED & PATENTED IN 1844,)

COMBINING ALL THE LATEST IMPROVEMENTS,

MANUFACTURED ONLY BY

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FIRE-CLAY AND BRICK WORKS, STOURBRIDGE.

GAS-RETORTS, LUMPS, TILES, & FIRE-BRICKS,

OF EVERY DESCRIPTION.

A LARGE ASSORTMENT OF GAS-RETORTS IN STOCK.

STOCK FOR EXPORT READY AT THE WORKS, AND AT ELLESMERE PORT.

R. LAIDLAW AND SON,

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SOLE MAKERS OF

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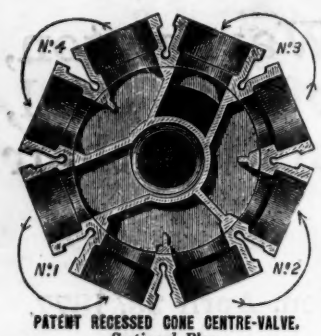
RECESSED CONE CENTRE-VALVES,

Constructed on the principle of the ordinary Plug-Cock.

THROUGH-WAY & FOUR-WAY COCKS

Of all descriptions.



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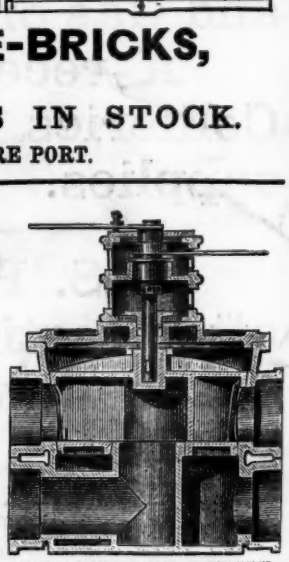

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Sectional Elevation.

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Invite the attention of Gas Companies, Corporations, and others to their

PATENT STREET LAMPS,

Which are so constructed that neither putty nor other materials are required to secure the glass. No hacking out of old putty, which frequently destroys the frames. A new pane of glass can be inserted in two or three minutes by any inexperienced person, the glass being secured by a hinged flap and turn button.

PRICE 10s. each, net. Special quotations for large quantities.
Also made EXTRA STOUT recommended for its durability, PRICE 11s. 6d. each.

D. HULETT'S IMPROVED SERVICE CLEANSER,

By the use of which stoppages in service and other pipes are freed from naphthaline and other obstructions in a few minutes. PRICE 73s. net.

HULETT'S PATENT MERCURIAL REGULATOR,

For inserting in mains, to prevent the excess of pressure in high ground, or other elevated positions.

PATENTEES OF IMPROVED WET AND DRY GAS-METERS.

Makers of all kinds of Pressure-Gauges, Gaseliers, and every kind of Gas-Fittings for the Trade.

GAS HEATING AND COOKING STOVES.

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